AUTOMOTIVE INDUSTRIES

PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

MAY 15, 1950

In This Issue . . .

Lancia V-Six Engine

Latin America's Tractor Market

Improved K-F Production Facilities

New Powdered Metal Applications

Buick's Newest Transfer Line

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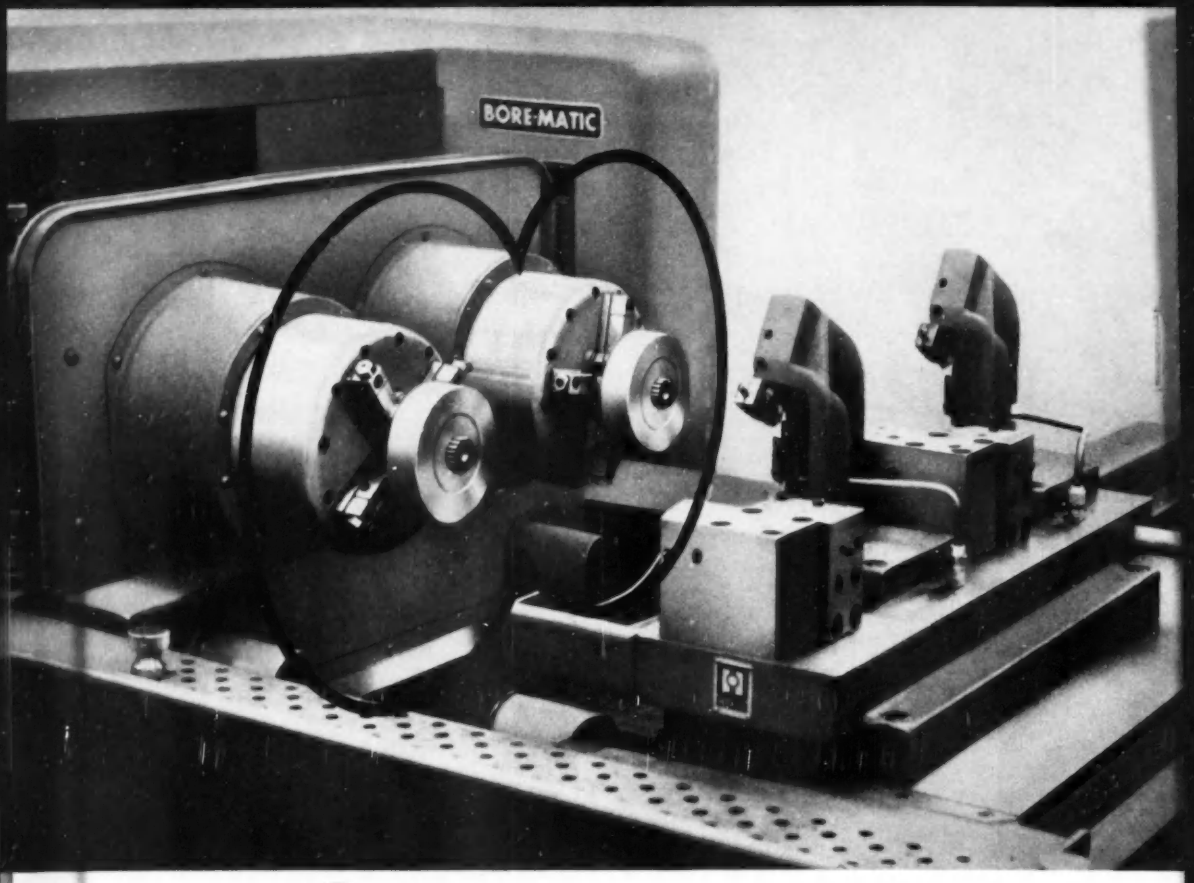
A CHILTON PUBLICATION



two heads are better than one!

The fundamental principle of doing two things at once to increase the amount produced is evidenced every day in Heald equipped factories the world over. Multiplicity of tooling and workholding equipment perform this simple A, B, C arithmetic just as surely as 1+1 equal 2. Naturally the implication is not only that two "heads" are better than one but any combination of multiple arrangements on both single and double end machines can mean increased output, greater savings for you.

New Heald model 321 Bore-Matic doubles production over previous methods

Before this Heald machine was installed, automobile clutch hubs were processed by separate operations on two machines. Now the entire job is done, twice as fast, in a single automatic cycle on the one Heald Model 321 Bore-Matic. The work is mounted on a splined arbor held in an air-operated diaphragm chuck on each boringhead. The O.D. is turned and chamfered and both faces generated by a tool block setup on the table cross slide.

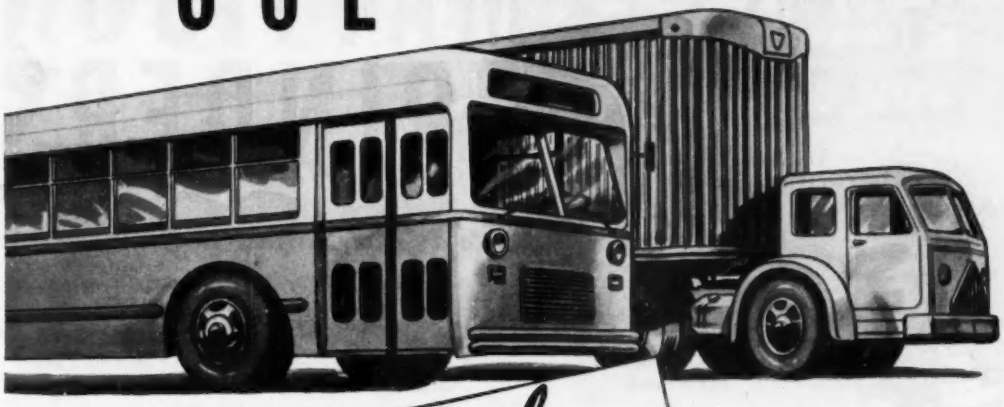
THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

HEALD

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York

FOR C·O·E TRUCKS AND BUSES...



Horizontal UNDER-FLOOR

... a new WAUKESHA ENGINE

• *Check these modern features:*

Crankcase—Combined crankcase and cylinder block lies in horizontal position with cylinders at 10° angle above horizontal supporting arms. Alloy iron casting is exceptionally rigid to insure constant alignment of all moving parts.

Cylinders—Renewable, wet-type cylinder sleeves of Molychrome alloy, heat-treated and hardened to insure long life.

Pistons—Heavy-duty aluminum alloy with four straight-side rings, all above the piston pin. Top ring is chrome plated. Piston pin is full floating.

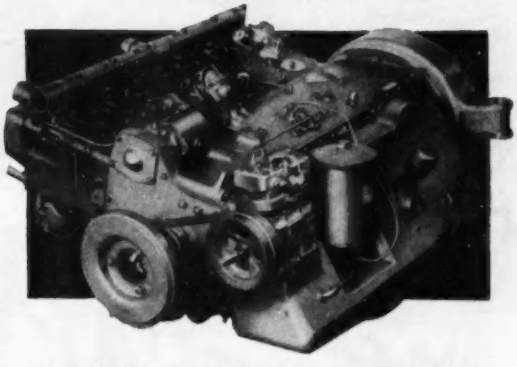
Counter-balanced Crankshaft—Drop-forged heat-treated alloy steel. Fully counter-balanced and mounted in seven 3¼-inch steel-backed copper-lead high-duty precision bearings. All main journals and crankpins are hardened to test 600 Brinell. The front end has a highly efficient vibration dampner.

Valves—Exhaust valves are Stellite-faced chrome-nickel forgings seating in Stellite inserts.

Cooling—A positive gear driven, ball bearing, packless coolant pump.

Lubrication—The positive gear driven oil pump forces oil under pressure to every main, rod, piston pin, camshaft, idler gear stud, and oil pump drive shaft bearing. An intermittent metered pressure line leads oil to the rocker arms and valve chamber as well as to the timing gear spray and air brake compressor. A large capacity oil sump with compartmentation insures a constant oil supply at all times. Both bayonet and indicating dial gauges are provided, as well as convenient inspection and drain openings. A large waste-packed filter is mounted on the oil pan.

Governor—Waukesha-built, gear driven, enclosed and flood-oiled over speed governor; does not prevent manual speed control up to predetermined top speed.



MODEL 140-GKB... Overall Lgth., 50 in.... Overall Width, 49 in. ... Overall Depth, 24 in.... Maximum Drop from Support, 11½ in.... Bore and Stroke, 4½ x 5½ in.... Six Cylinders... 525 cu. in. Displacement... Seven Main Bearings... Flywheel Housing, SAE No. 3 ...172 hp. Max. at 2600 rpm.

•

You'll want to learn the other details. Write for full particulars or engineering consultation. No obligation.

WAUKESHA MOTOR COMPANY • WAUKESHA, WISCONSIN

NEW YORK • TULSA • LOS ANGELES

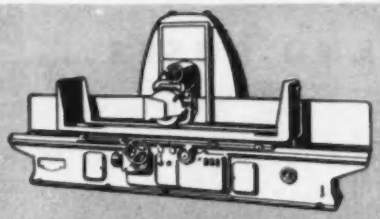
MATTISON GRINDERS

If its a Flat Surface to Grind
There's a Mattison to Grind it.

● With the addition of the production grinding machinery formerly made by the Hanchett Manufacturing Company, Mattison now is in a position to work with you on all your surface, face and disc grinding problems. These machines are made in various types to handle a wide range of work. Experienced fixture engineers are available to give you best production efficiency with Mattison Machines.

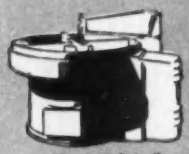
For any flat grinding, ask for our recommendations on the proper method and machine for your job. No obligation, of course.

For catalog on all machines, ask for free copy of general bulletin.



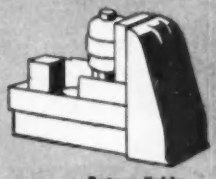
Precision Surface Grinders Horizontal Spindle

Disc Grinders, Double Spindle Type



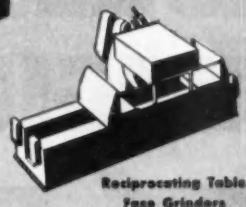
Vertical Spindle Disc Grinders

Plane Grinders, Rotary Table Type



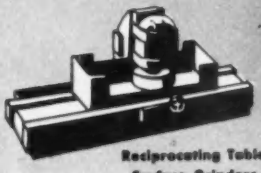
Rotary Table Surface Grinders

Automatic Rotary Surface Grinders



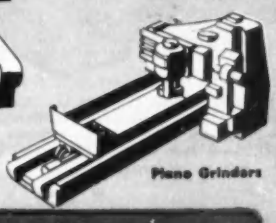
Reciprocating Table Face Grinders

Disc Grinders, Single Spindle Type



Reciprocating Table Surface Grinders Vertical Spindle

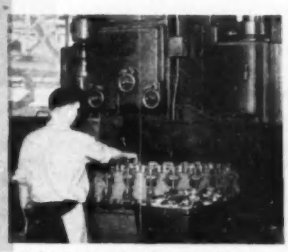
Face Grinders, Traveling Wheel



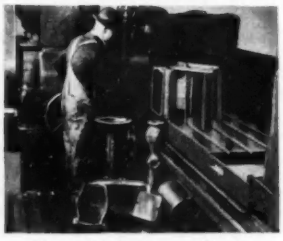
Plane Grinders

40 hours before — now 4 hours. Pump case ground on Mattison Horizontal Spindle Precision Surface Grinder

320 surfaces of cast iron compression heads per hour, removing 1/32" stock with Mattison No. 24 Rotary Surface Grinder



900 connecting rods per hour, using 40 station fixture to finish grind crank and wrist pin end of assembled rod with Mattison No. 72 Grinder



Shows variety of work run on Mattison Face Grinders

MATTISON MACHINE WORKS
ROCKFORD · ILLINOIS

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

May 15, 1950 Vol. 102, No. 10

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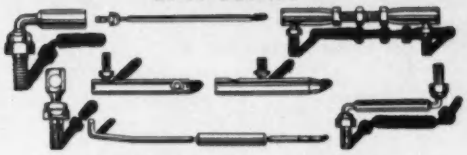
TOUREK

BALL JOINTS, PIPE PLUGS AND QUALITY SCREW MACHINE PRODUCTS

BALL JOINTS



Tourek's quality Ball Joints meet exacting requirements. Simplified design, improved performance, and lower costs result from specifying Tourek Ball Joints . . . the only recognized standard. Large stocks assure prompt delivery.

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Tourek's precision countersunk steel pipe plugs are accurate, high strength, and economical—resulting in the highest quality at costs which are competitive to old style plugs.

Stock sizes, available with National Pipe or Dry-Seal threads are: ¼", ⅜", ½", ¾" and 1". Also available on special order in alloy steels, aluminum or brass in sizes up to 2⅜" diameter.

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Modern high-speed single and 6-spindle automatics—together with complete secondary equipment, including grinding and brazing—plus 30 years' experience, assure you "The Best in Quality Screw Machine Products."

Your requirements, up to 2⅜", are made with utmost precision, and with promptest delivery assurances.

LITERATURE—Comprehensive data on any or all Tourek products sent promptly upon request. Write for yours now. J. J. TOUREK MFG. CO., 4701 West 16th St., Chicago 50, Illinois.

TOUREK

"THE BEST IN QUALITY SCREW MACHINE PRODUCTS"

ESTABLISHED IN 1920

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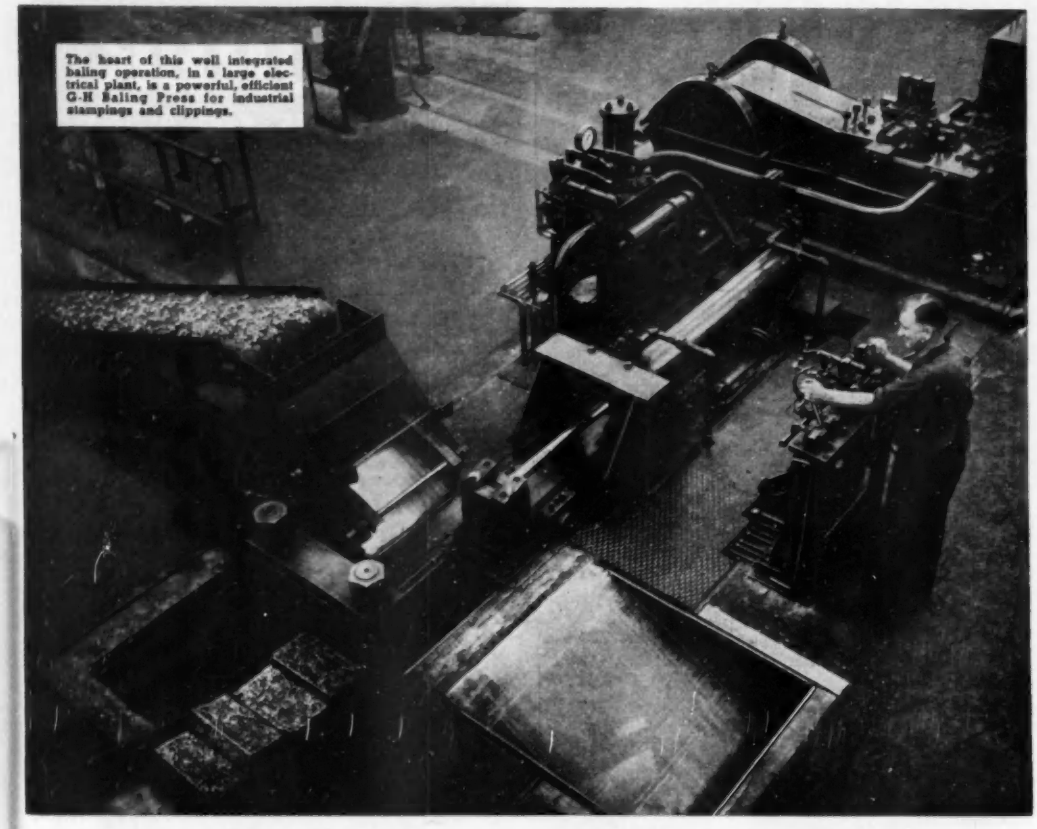

The heart of this well integrated baling operation, in a large electrical plant, is a powerful, efficient G-H Baling Press for industrial stampings and clippings.

BALING *Sheet Metal* SCRAP PAYS Multiple Dividends...

The experience of hundreds of metal working and metal producing plants proves that the baling of industrial stampings and clippings ... ferrous and non-ferrous ... pays dividends in many ways. Here are a few of the benefits:

- It helps to establish an orderly, integrated scrap salvage program.
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- As "raw material" it contributes to the conservation of natural resources ... and to lower material costs.

If your plant generates a sufficient volume of sheet metal scrap, you can realize multiple dividends by investing in the right size and type of baling press. GALLAND-HENNING builds powerful hydraulic balers in a range of sizes and capacities for every industrial need. For competent counsel on the Profitable Baling of your Sheet Metal Scrap, write ...

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GALLAND-HENNING

SCRAP METAL BALING PRESSES

A 5737-1P

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"...because Muskegon produces top quality piston rings economically, and we can rely on their delivery promises."

Muskegon offers you unusually *complete* service on both production and service piston rings. For Muskegon can design your rings . . . cast them . . . produce them . . . package them . . . and aid in merchandising them. Muskegon can do any one, or all of these jobs for you. And this wide range of services is solidly based on nearly thirty years of experience, on rich resources in both plant and personnel. Bring your piston ring problems to Muskegon!

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THEY ALL AGREE...

"we like to do business with Muskegon!"

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"Because Muskegon anticipates our requirements and gives us unusually quick service."

Policy

"It is Muskegon's firmly established policy to sell exclusively to manufacturers (1) for installation as original equipment and (2) for resale for service purposes."

Piston Rings

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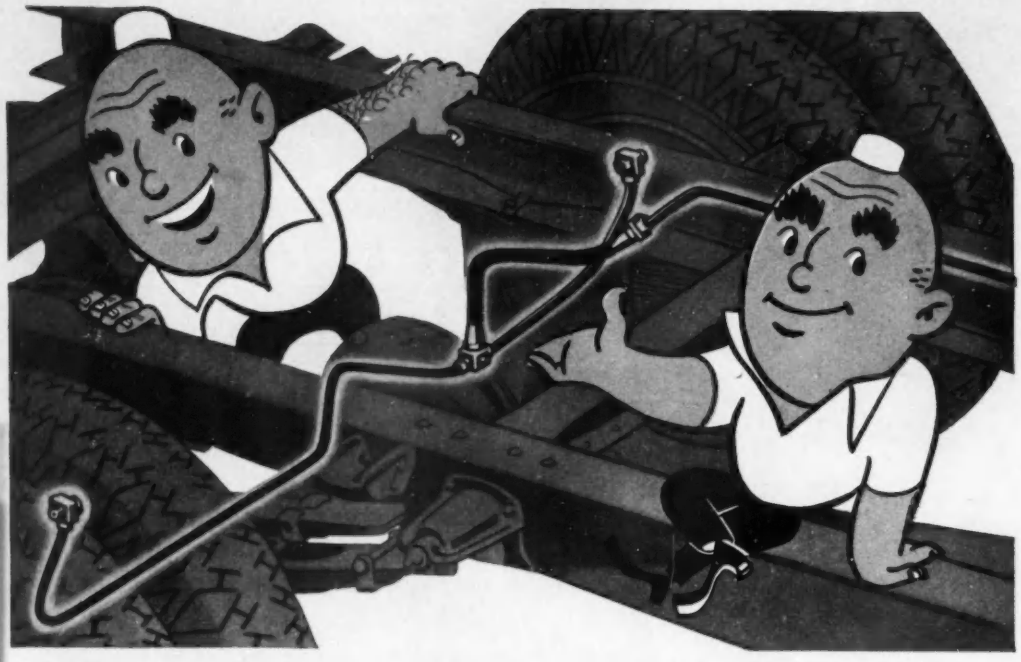
PLANTS AT MUSKEGON AND SPARTA

"THE ENGINE BUILDERS' SOURCE"



Tried and true in truck lines, too . . . Bundyweld Tubing

Bundyweld Tubing rates top preference for use in today's transports of the highway—from 1½-ton pickups to thirty-ton "semi's."

Used in fuel lines, oil lines and all-important hydraulic brake-line systems, this amazing tubing assures the same qualities of endurance and performance it brings to so many of today's automobiles.

It's made by a patented process, double-walled from a single strip, copper-bonded at all points of wall contact. Vibrations, stress, strain—this extra-strong, sturdy tubing takes them *all* in stride. Its pressure-proof walls will last as long as your product, and the more rugged the going, the better Bundyweld performs.

Bundyweld's *right* from the moment it's rolled. Completely fabricated, thoroughly inspected right on the job, it's made to your exact specifications, in any amount you want. Ductile, lightweight Bundyweld spells less rejects, increased production, better finished product in any automotive tubing application.

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Bundyweld® Tubing

DOUBLE-WALLED FROM A SINGLE STRIP

WHY BUNDYWELD IS BETTER TUBING

Bundyweld starts as a single strip of basic metal, coated with a bonding metal. Then it's . . .

continuously rolled twice around laterally into a tube of uniform thickness, and

passed through a furnace. Bonding metal fuses with basic metal, presto—

Bundyweld . . . double-walled and brazed through 360° of wall contact.

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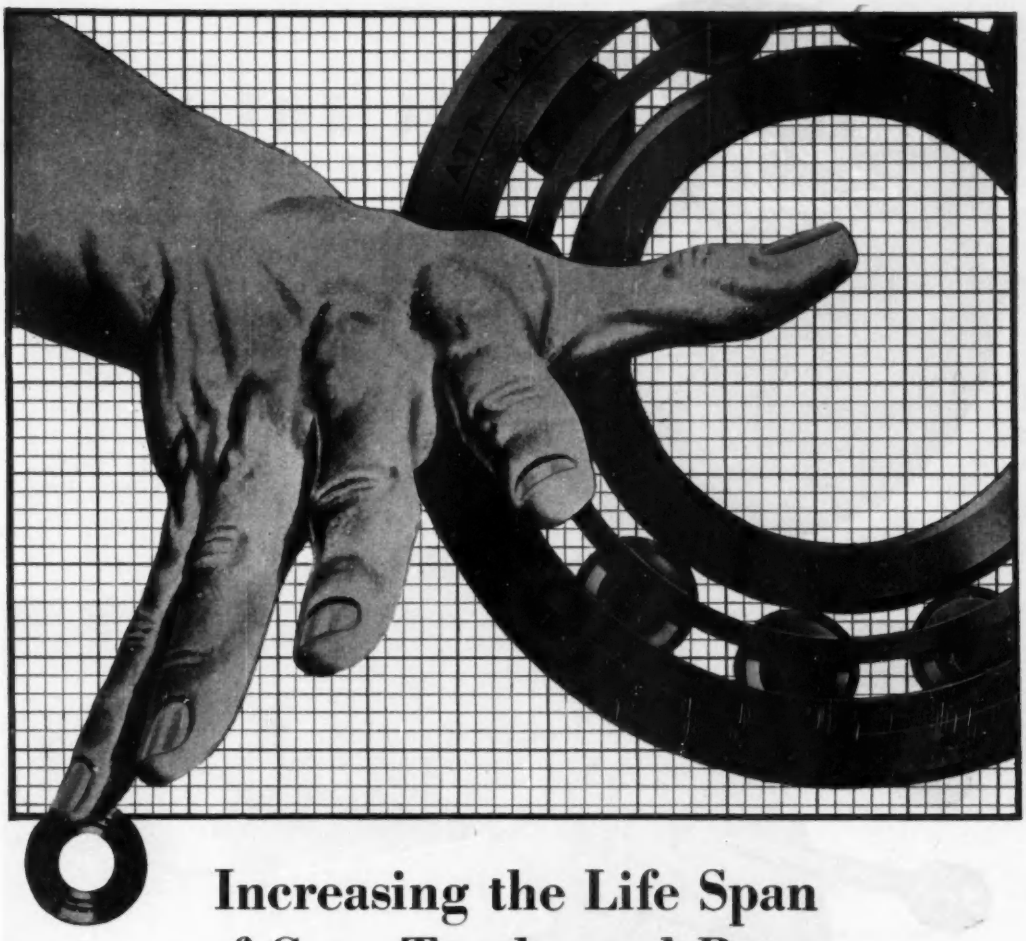

Increasing the Life Span of Cars, Trucks and Buses

In addition to the millions of cars, trucks and buses now on the road equipped with Hyatt Roller Bearings, more and more are coming off the assembly lines —all designed and built with the same proven long-life span.

It is not surprising to us that motor vehicles stand up as well as they do under the tough usage they get. For many years we have been familiar with the design-engineer's skill which goes into their construction. And year after year, Hyatt Roller Bearings have been built to deliver the dependable service at vital positions which these engineers look for.

We acknowledge the great contribution to progress the Automotive Industry has made and we are glad to have been one of their important suppliers for more than fifty years. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.; Detroit, Michigan.

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Specify—

N·A·X

HIGH-TENSILE STEEL

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- NAX GREAT IMPACT TOUGHNESS
- NAX HIGH STRENGTH
- NAX HIGH FATIGUE RESISTANCE
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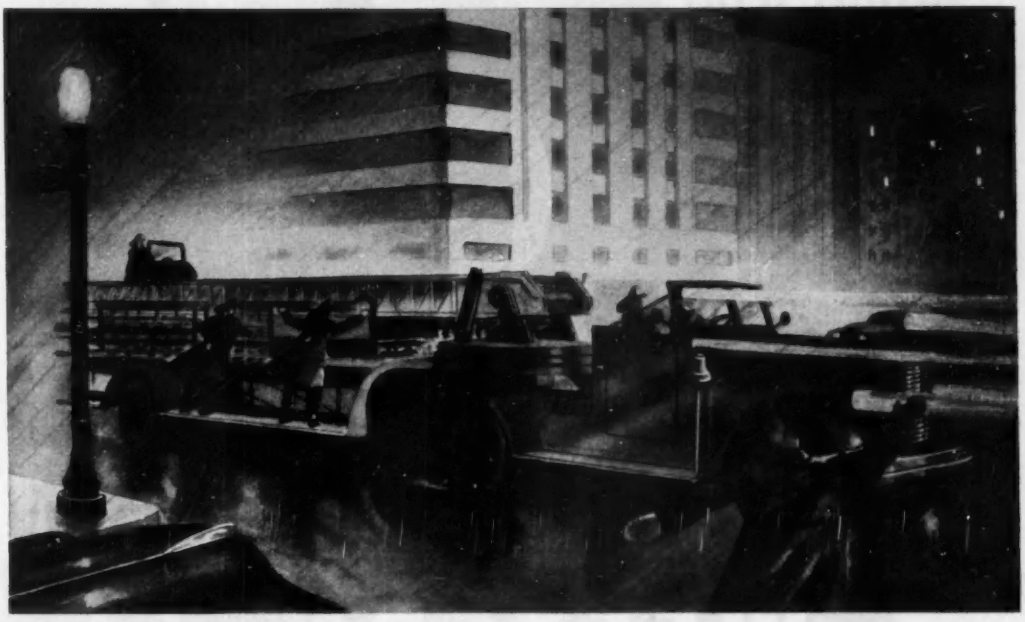
- NAX EXCELLENT WELDABILITY
- NAX HIGH CORROSION RESISTANCE

GREAT LAKES STEEL CORPORATION N-A-X ALLOY DIVISION • ECORSE, DETROIT 29, MICH. • UNIT OF NATIONAL STEEL CORPORATION

WHEN THE JOB IS *Tough*



PIRSCH SENIOR AERIAL LADDER TRUCK

ROSS BRINGS EASE . . . AND ECONOMY

IN ANY WEATHER, night or day, under any road or traffic condition, every tough job of steering becomes easier and safer when the steering is *Ross* . . . The Pirsch Senior Aerial Ladder Truck, pictured above, is one of the finest products in its field and is well-steered by Ross.

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(1) ***Increased mechanical reduction*** . . . (2) ***More compactness*** . . . (3) ***Reduction in weight*** . . . (4) ***Greater arm angular-travel*** . . . (5) ***Improved metallurgy*** . . . (6) ***Increased efficiency.***

Throughout 43 years of leadership in this industry, Ross gears have been distinguished for long life, simplicity of adjustment and maintenance of long-recognized qualities of safety, stability and performance. We invite discussion of any steering problem.

Ross

Cam & Lever ***STEERING***

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JUST A FEW USES:

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- Isolating vibration
- Controlling temperature
- Reducing weight
- Excluding dust, grit, etc.
- Cushioning shock
- Filtering liquids
- Grinding and polishing gaskets, grommets, etc.
- Padding, packing, sealing

Felt's versatility suggests unlimited applications for design needs. Western Felt is available in any form—rolls, sheets, custom cut parts. Felt can be treated chemically to meet practically any requirement.

Western Felt, processed from wool-soft to rock-hard does not fray, ravel or lose its shape. It is cut to remarkably close tolerances and its uniformity is unsurpassed. Felt can be supplied to meet Army, Navy and S.A.E. specifications.

Why not check Western Felt's superior qualities and possible uses. Our engineers will gladly cooperate.

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102

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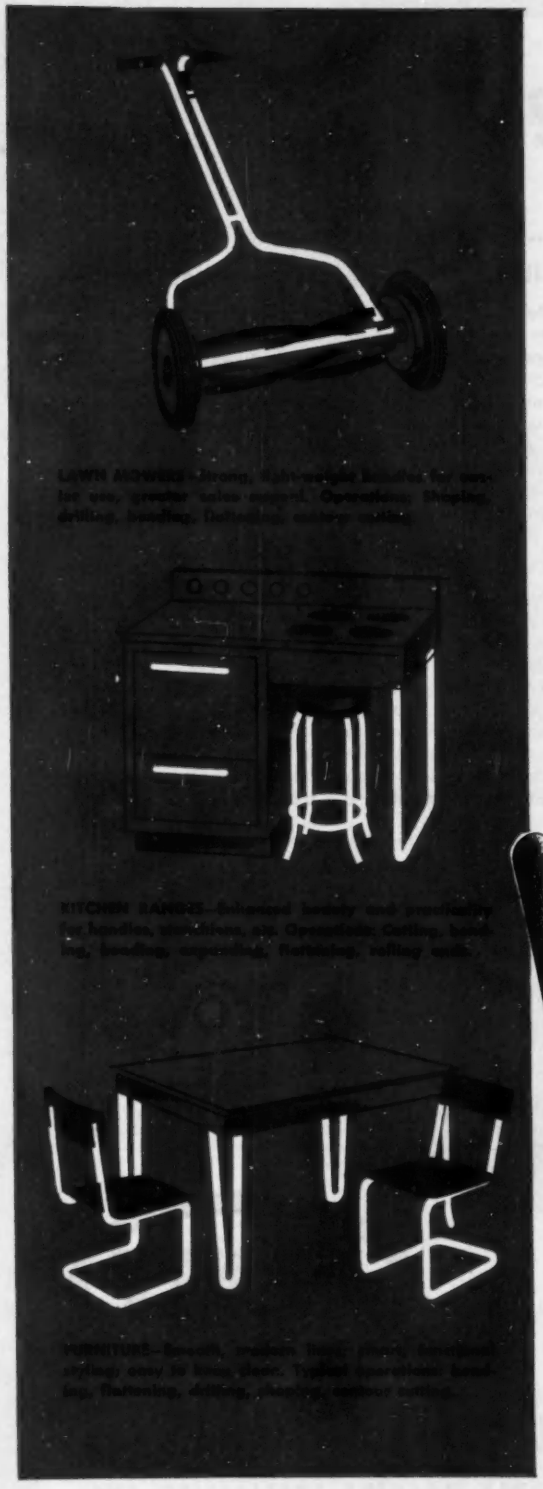

THE BIG TREND IS TO OSTUCO TUBING

Today, modern products of almost every description are being built entirely or in part from steel tubing. And with leading designers and manufacturers across the nation, the big trend is to OSTUCO Tubing. The reason—OSTUCO's "Single Source Service."

By performing all three basic tubing operations —manufacturing, shaping and fabricating—at one plant, OSTUCO speeds deliveries, assures uniform high quality, and appreciably reduces final costs.

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OSTUCO produces both seamless and electric welded steel tubing in a broad range of sizes and shapes . . . performs ALL types of forging and fabricating operations . . . supplies finished or semi-finished products. Write direct or to our nearest sales office for informative free booklet "Fabricating and Forging Steel Tubing."

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Threading • Angle Cutting • And Many Others

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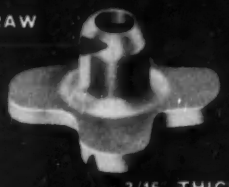
...a new production record made possible by higher press operating speeds

Deep drawing heavy gage coil stock at high speeds on progressive dies is a real test for a press. In this operation, like the one shown, a Danly Autofeed is achieving shift production running close to 4000 units in spite of time required for restocking and die changing.

And in the matter of die life, this production average speaks for itself. Precision closure and extra rigidity built into this Danly Autofeed assure longer runs before die sharpening is required.

DEEP DRAW



3/16 THICK

1010 HOT ROLLED STRIP

DIE LIFE IMPROVED. In this application, the [illegible] operating speed made possible by Danly Press construction features resulted in an important increase in the number of pieces produced per die.

Danly Presses Run Longer

Records like this are made possible by exclusive mechanical features found only in Danly Presses. First, there is the new Danly cool-running clutch, designed to outwear conventional press clutches because less destructive heat is generated. And a special forced air cooling system keeps the clutch operating temperature only 35° above room temperature. Other advantages include positive pressure lubrication throughout and sensitive control reaction to facilitate die try outs.

CHECK THESE
EXCLUSIVE DANLY PRESS FEATURES

- ✓ cool-running clutch
- ✓ extra rigidity
- ✓ complete pressure lubrication
- ✓ special controls—sensitive reaction
- ✓ precision construction

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MECHANICAL PRESSES...50 TO 3000 TONS

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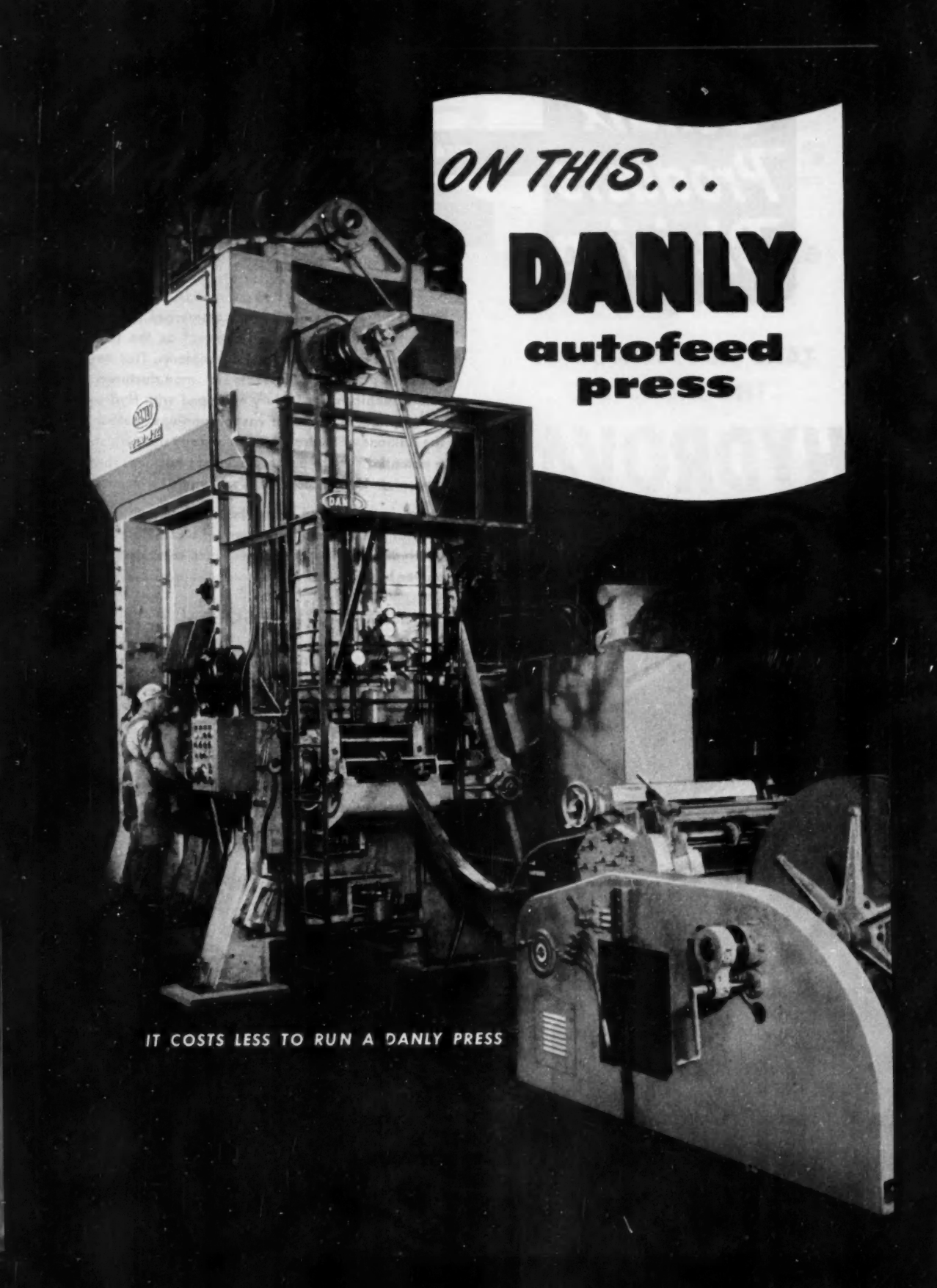
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IT COSTS LESS TO RUN A DANLY PRESS

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AUTOMOTIVE INDUSTRIES
Reg. U. S. Pat. Off.

High Spots of This Issue

★ **Newest Transfer Line for Cylinder Blocks**

Buick has a new transfer machine line for machining cylinder blocks of the Buick 1950 Super engine. Removing metal at higher speeds and feeds, it results in remarkably simplified processing, increased automaticity, higher productivity. Its story, absorbingly described and amply illustrated, begins on page 30.

★ **Aircraft Trends Benefiting Automobile Design**

The author here advocates consideration of aircraft functional design for automobiles in terms of increased driver vision forward and sideways, down and up; seating comfort; ease of control; crash padding needs; instrument lighting; style adaptation; reduction of drag and weight; and construction and production practices. It's thought-provoking. See page 35.

★ **New Applications for Powdered Metals**

Though an old mass-production art, powder metallurgy in recent years has evolved by leaps and bounds. Here are described the numerous unique properties of powdered metal parts which increasingly fit them for an amazing diversity of modern applications. Page 36.

★ **K-F's Improved Facilities for 1951 Model**

A total of more than 16 miles of conveyor lines planned for at K-F is only one of the specific strides being made at Willow Run in the direction of increased mechanization. Others include automatic devices for unloading the conveyors, and huge welding fixtures of most advanced and simplified design. See page 38.

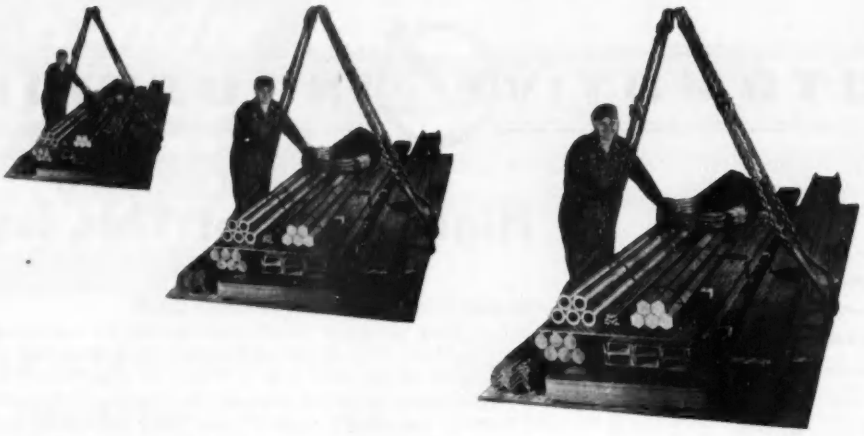
★ **Packard's Ultramatic Transmission—Part Three**

Step by step this article traces assembly of the Ultramatic Transmission through a modern, flexible plant layout. A clear diagram of the assembly line is shown. An unusual departure in final-assembly line technique—how a single operator completes the entire assembly unit himself instead of each worker doing a share—is explained. Page 46.

★ **31 New Product Items And Other High Spots, Such As:**

The new Lancia Aurelia with a V-Six engine; the improved LeRoi engine; the latest Hispano-Suiza aviation engine; Latin America's importance as a tractor market; a report on the Metal Powder Show; the fatigue limit of chromium-plated steels; rubber as used in the modern U. S. automobile; and the large attendance at the Machine Tool Forum in Buffalo.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3



How to Lower Your Steel Costs

Have you considered revising your steel buying policies in the light of our current prices? Many steel users are making changes, because there are now additional savings to be gained by eliminating small lots from mill orders and grouping these items with a dependable warehouse source.

Here are a few facts that should prove helpful:

1. Because of differences in mill and warehouse operations, mill prices* are based on the individual weight of each item while Ryerson warehouse prices enable steel users to obtain a quantity discount on the total weight of all hot rolled carbon steel products shipped to one place at one time.

   This fact, together with recent changes which have further altered the relationship between mill prices and our warehouse prices, now make it possible to buy certain quantities of many products from our steel-service plants for little or no more than from mill. And you get the steel from stock at once.

2. When buying from us you can purchase steel from our stocks just as you need it. In this way you avoid tying up capital which may be needed elsewhere.

3. Warehouse purchasing allows you to hold your inventory at a practical working level, thereby eliminating the possibility of loss from changes in product design or market conditions.

4. Ryerson plants—with steel in stock from many mills, make it possible for you to group your purchasing of all current requirements. With one order, one invoice and one shipment covering a whole group of steel products, substantial savings can be effected.

5. There's no waiting for steel from Ryerson. Every requirement can be taken from stock, cut to size and shipped promptly, often preventing expensive delays in production.

Ryerson nation-wide steel-service plants make it possible for you to take full advantage of this money-saving method of steel buying. Our representatives—well schooled in steel price relationships—will gladly advise you on how to purchase your steel most economically. Our stocks are the nation's largest, our cutting and handling facilities modern and complete. Whether your order is large or small, prompt, personal attention and quick delivery are always yours.

*As published in a recent issue of Iron Age.

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RYERSON STEEL

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PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

News of the AUTOMOTIVE INDUSTRIES

Vol. 102, No. 10 May 15, 1950

Industry Baffled by Boom In Automobile Sales

No one in Detroit seems to be able to account for the early and continuing demand for new automobiles, but the rate of output is still on the increase and Chrysler should get back into volume production fast enough so that total output this month should climb to a dizzy height of more than 700,000 vehicles, an all-time record. As it is, sales and production records are falling all over the place with ten day reports of sales looking better each consecutive period. Latest registration figures from R. L. Polk indicate that March also set a new high in automobile sales with an estimated 465,000. Truck registrations also were on the increase and are expected to be higher than March of 1949 although not up to the boom level of 94,086 registered in March, 1948.

"Henry J" Is Name Selected for New Small Kaiser

The new low priced Kaiser car scheduled for announcement about July will be called the "Henry J." That name was selected as the winner in the K-F $200,000 name-the-car contest which drew 457,000 entries. The first 13 place winners all submitted the same name with the selection of winners on the basis of their reasons for selecting the name in 25 words or less. First prize of $10,000 was won by Mrs. Charles Atkinson of Denver and second place, $5000, went to Danna D. Sherrill also of Denver. Third prize and $2000 was awarded to Gordon S. Lockridge, Portland, Ore. In all, there were 1023 winners.

Detroit Arsenal Producing New and Rebuilt Tanks

The Detroit Arsenal operated by Chrysler during the war has begun production of General Patton tanks and also of a smaller model. The plant has been retooled since the end of the war and is currently turning out about four 45-ton M-46 General Patton tanks a day and two daily of the smaller 25-ton models. The large unit is powered by a 12-cyl aircooled Continental engine especially designed for tank use. It is equipped with a torque converter type transmission. In addition to building new tanks, the Arsenal is rebuilding several hundred medium tanks for both American forces and Western European nations.

COMMODORE'S CONVERTIBLE

The new 1950 Hudson Custom Commodore convertible is available with a choice of 123-hp six-cyl or 128-hp eight-cyl engines. The new model has a wheelbase of 124 in., is offered in 12 colors, and is now being shipped to dealers throughout the United States.

Austin A40 Sets 36 Stock Car Records

An Austin, A10 Devon sedan established a total of 36 stock car records in its class during a 19-hr speed and endurance run held recently at Westhampton, L. I., N. Y., it was announced in New York City recently by the Contest Board of the American Automobile Association.

Tractors and Parts Shipped In 1949 Up Nine Per Cent

Showing an increase of nine per cent over 1948, manufacturers' shipments of complete tractors and tractor attachments and parts totaled $1059 million in 1949, according to the Bureau of Census, Dept. of Commerce. The value of complete tractors shipped during 1949 was $783 million, which was 14 per cent more than 1948 shipments.

Independents Doing Well in Booming Market

Earnings reports show that the independents are doing very well for themselves. Nash for the quarter ended March 31 reported a profit of more than $7.2 million, compared with $4.2 million for the previous quarter when earnings were affected by the steel and coal strikes. Studebaker reported a net profit of more than $6.9 million, compared with $5.2 million for the corresponding quarter of 1949 and $4.2 million for the same period in 1948.

Studebaker Orders Tooling for Overhead Valve V-8

Confirming evidence that Studebaker is planning a new V-8 overhead valve engine comes from sources in the machine tool industry, who say that tooling for such an engine has been ordered. It is not known when the new engines will go into the Studebaker line, but it appears that they should be ready for the next model change.

New GM Transmission May Have Direct Drive

Latest reports, although unofficial, indicate that the new GM automatic transmission slated for Cadillac on the next model will lock up in direct drive through a clutch in much the same manner as the Packard Ultramatic and the Studebaker - Borg - Warner unit. There is also some evidence that Hydra-Matic as now constituted may undergo some changes on next year's models.

News of the AUTOMOTIVE

1951 Kaiser Prices Lower—DeLuxe Sedan Cut $96

Kaiser-Frazer has made good on a prediction made early this year that prices of the new Kaiser line would probably be lower than for comparable 1950 models. Prices just announced show a reduction of $96 on the four-door deluxe sedan below the 1950 model price. Price of the four-door Kaiser Special is $1989, factory delivered with transportation and state and local taxes extra. Prices of other models on the same basis are as follows:

Special Series

Two-door	$1939
Two-door utility	2039
Four-door utility	2089
Business coupe	1889
Club coupe	1959

DeLuxe Series

Four-door	$2099
Two-door	2049
Two-door utility	2149
Four-door utility	2199
Business coupe	1999
Club coupe	2069

Hydra-Matic drive will be offered on the new models, but will not be available for several weeks.

Finally Settle Costly Chrysler Strike

More than 89,000 Chrysler workers and 50,000 employes of suppliers went back to work May 8 following settlement of the costly 99-day Chrysler strike. Briefly, the settlement provides for $100 a month pensions paid for by the company with the pension program to be funded. Improved hospital, medical, surgical benefits are provided with the cost to be shared equally by the company and the employes. These include sickness and accident insurance, group hospital, surgical and in-hospital medical benefits. The company had previously paid no part of benefits of this type.

Pensions are paid at age 65 with 25 years of service, five years less than required at Ford, and includes Social Security benefits. For those with less than 25 years service proportionate pension benefits are provided, and those with 25 years of service, but retiring between 60 and 64 provision get a smaller pension when retirement is with company consent. Workers may work to age 68, and beyond with company consent, and accumulate service credits up to age 68. Other provisions provide for incapacity retirement benefits of $50 a month after age 55 with 25 years of service. A joint union-management board will administer the pension program, but all funds will be controlled by an outside trustee. Life insurance of $3600 per employee is furnished with company and workers sharing the cost. Dues check-off is provided. The pension agreement runs for five years and the rest of the contract for three years with provision to reopen twice on wage levels and insurance only.

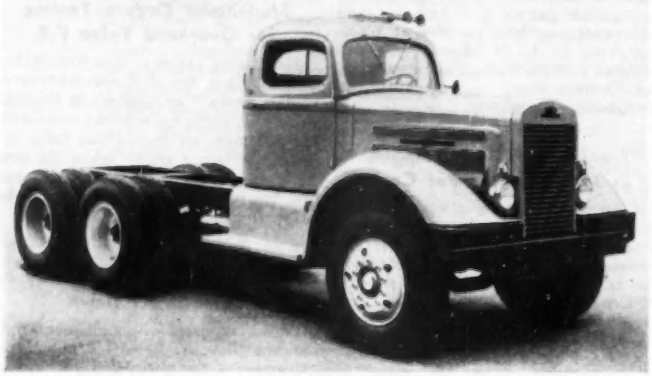
1950 MOTOR VEHICLE FACTORY SALES FROM U. S. PLANTS*

	Passenger Cars	Trucks	Buses	Totals 1950	Totals 1949
January	487,854	93,622	219	581,695	431,276
February	386,025	89,668	133	474,826	426,665
March	469,529	109,717	189	579,443	516,118
Total—Three Months	1,342,408	293,007	551	1,635,964	1,376,099

1950 FACTORY SALES TO DOMESTIC AND FOREIGN MARKETS*

	Passenger Cars		Trucks		Buses	
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
January	475,495	12,359	84,354	9,268	194	25
February	377,188	7,840	80,939	8,729	128	5
March	461,118	8,410	90,796	8,921	170	29
Total—Three Months	1,313,799	28,609	256,089	27,918	492	59

* Automobile Manufacturers Association.



ONE OF TWO

The new WC-2864-ET tandem drive tractor, shown above, together with the new WC-2264-ET, was recently announced by the White Motor Co. The WC-2864-ET weighs 12,210 lb, has a wheelbase of 152 in., and is powered by the White 280A engine which develops 184 hp. The WC-2264-ET has a 154-in. wheelbase, and is powered by the Super Power 150A engine which develops 135 hp.

Crosley to Introduce New "Farm O' Road" Vehicle

Crosley Motors, Inc., plans to introduce a new vehicle called the "Farm O' Road" designed for use on the farm as well as the highway, according to reliable reports. To be offered with a full line of attachments, such as plow, mower, and so forth, the vehicle will have a power take-off front and rear, a hydraulic lift, and dual rear wheels. Powered by the 26½-hp Crosley engine, its wheelbase will be 65 in.

Ingersoll Made President of Borg-Warner Corp.

Roy C. Ingersoll has been elected president of Borg-Warner Corp. to succeed C. S. Davis, who has been named to a newly created office of board chairman. Mr. Ingersoll previously had been a B-W vice president and president of the Ingersoll, Franklin, and

Calumet steel divisions. G. A. Shallberg, previously executive vice president of B-W, was elected chairman of the executive committee. His former duties as executive vice president will be assumed by Mr. Ingersoll. The company has also announced election of a new vice president, A. P. Emmert, president of the Warner Gear Division.

Ford of Canada Announces $7.5 Million Expansion

The start of an expansion and modernization program involving "many millions of dollars" has been announced by Rhys M. Sale, president, the Ford Motor Co. of Canada, Ltd. He told the company's annual meeting that one of the first projects to be undertaken is a $3.5 million steam and electric generating plant at the Ford works in Windsor, Ont., Canada. Two months ago the company announced purchase of a 205-acre site in Windsor for future development. The first stage in this is expected to be a $4 million national parts depot.

Del S. Harder, vice president-manufacturing of Ford Motor Co., and Theodore J. Emmert, director of organization and development of Ford of Canada, have been elected to the board of directors.

Chrysler Names J. C. Zeder Director of Engineering

James C. Zeder, president of the SAE, has been named director of engineering and research of Chrysler Corp. Previously, he had been chairman of the engineering board of the engineering division, and in his new post will have responsibility for coordinating and directing all the company's engineering and technical activities. He has been connected with Chrysler ever since the company was organized in 1925. He will report to his brother F. M. Zeder, Chrysler vice president and vice chairman of the board.

RFC Loans $13 Million to Glenn L. Martin

Glenn L. Martin Co. of Baltimore has negotiated a Reconstruction Finance Corporation loan in the amount of $13 million for the purchase of machinery and equipment and for working capital. It is repayable in two years. The RFC has also approved a loan of $1,250,000 to the National Steel and Shipbuilding Corp. of San Diego, steel fabricators and shipbuilders.

ASTE Names Committee for Research Foundation

To coordinate plans for setting up the American Society of Tool Engineers Research Foundation, the following committee has been named: A. M. Sargent, president, Pioneer Engineering and Manufacturing Co.; William H. Smila, master mechanic, Plymouth Motor Div., Chrysler Corp.; Professor O. W. Boston, University of Michigan; and Professor J. N. Edmondson, Ohio State University. Mr. Sargent is chairman of the committee.

K-F Using Plastics Method to Shape Body Dies

Kaiser-Frazer is the first automobile manufacturer to announce use of a new method for making body dies by use of casting resins. Plastic molds are taken directly from the clay body sections and used for models for steel stamping dies. K-F had used the process earlier for fabrication of some larger body panels and has used it entirely for die making for the new low priced car which will go into production in June. K-F claims that the time required for making the dies was about half that needed with the wood model process. The method is similar to that described in AUTOMOTIVE INDUSTRIES, Jan. 15, 1950, page 39. K-F says that the final design of a low priced car body was not finalized until last October and that four or five months of tooling time were saved with the plastic method, enabling production to begin next month. K-F engineers worked out the plastic method in cooperation with Kish Plastics Co. of Lansing, Mich.

Eastern Air Lines to Get New Super Constellations

Super-Constellations, built to accommodate 110 passengers, are to be assembled for Eastern Air Lines for delivery about mid-1951. The new version Lockheed Constellation will be 19 ft longer, with a weight increase from 107,000 to 116,000 lb. Ten new ships have been ordered by Eastern at a cost of $18 million including spare parts and engines. Allison turbo-prop engines are expected to be installed on the new Constellations in about three or four years. This would increase the plane's horsepower from 11,000 to 14,000 hp and the speed from 350 to 400 mph.

Army Awards $2.9 Million in Automotive Contracts

Contracts totaling nearly $2.9 million worth of automotive spare parts were awarded recently by the Army Dept. The awards were made to the Armstrong Rubber Co., West Haven, Conn., $434,800; Jefferson Chevrolet

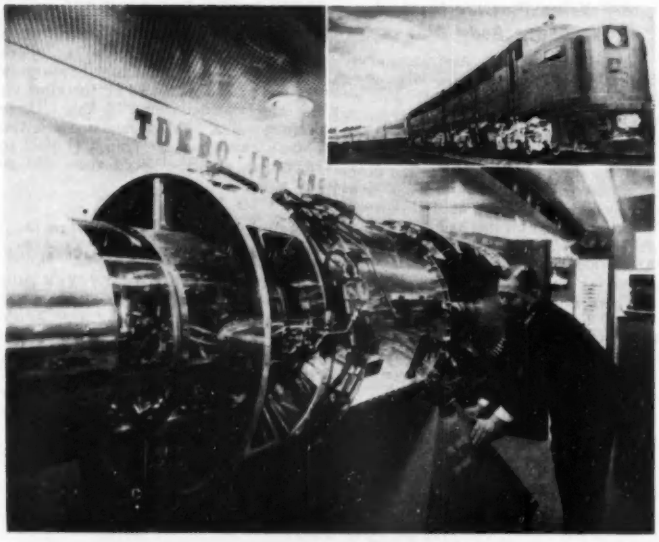
ONE OF THREE

International Harvester's newly-announced line of multistop delivery trucks with Metro all-steel bodies (see page 19, May 1st AUTOMOTIVE INDUSTRIES) are available in three body sizes. This is Model LM-120 with a 7¼ ft body and 235-cu ft capacity on a 102-in. wheelbase chassis.

Co., Detroit, $357,500; Kelly Springfield Tire Co., Cumberland, Md., $324,840; Cooper Tire & Rubber Co., Findlay, O., $220,840; Mansfield Tire & Rubber Co., Mansfield, O., $195,840; Gar Wood Industries, Inc., Wayne, Mich., $185,000; Denman Rubber Mfg. Co., Warren, O., $109,940; the Chrysler Corp., Detroit, $108,847; Murphy Diesel Co., Milwaukee, Wis., $129,039; Willys-Overland Motors, Inc., Toledo, O., $377,026; L. F. Pease Co., Providence, R. I., $277,380; and National Wholesalers, Inc., Los Angeles, Calif., $155,100.

GE's Exhibit Train Starts Tour of Country

The General Electric Co.'s More Power to America Special (see cut on this page) represents the first attempt to display, in one series of related exhibits, the complete range of products for the production, distribution, and industrial utilization of electric power. In New York on the first lap of a nation-wide tour, it will visit about 150 key industrial centers during 1950 and 1951. During May and June, the train will visit cities in New York, Connecticut, Rhode Island, Massachusetts, Maine, New Hampshire, and Vermont. Exhibits in the Special are grouped in 11 major sections: power generation, transmission, and distribution; drives and controls; materials handling; welding; industrial heating; renewal parts; industrial lighting; components for industry; measurements; civic improvement; and national security. The train contains displays covering the complete range of apparatus for industry. Individual exhibits cover such equipment as turbines, sub-stations, transmission equipment, motors of all sizes and ratings, complex drive systems, industrial and street lighting fixtures, precise instruments, welding and heating equipment, Diesel-electric switchers, controls, urban transit and railroad equipment. Others relate to atomic power, weather research, guided rockets, aircraft jet engines, ultrasonics, ship propulsion equipment, fire control systems, and "snow-making" techniques.



TWO THOUSAND IN TEN

In the upper right hand corner, General Electric Apparatus Dept's 10-car exhibit streamliner is shown, hauled by a 4500-hp, two-unit Alco-GE Diesel-electric locomotive, and filled with exhibits of over 2000 of the company's latest products, systems, and techniques for producing and utilizing electric power. H. P. Bish, manager of GE's Aircraft, Federal and Marine Divisions, Apparatus Dept., is seen inspecting one of the displays: a full-size cutaway model of the GE J-47 turbojet engine.

Mead L. Bricker Retires— With Ford 46 Years

Mead L. Bricker has retired as vice president and member of the administration committee of the Ford Motor Co., but will retain his directorship and will also act as a special consultant. Mr. Bricker retired early in May following his 65th birthday April 24. The company has also announced the election of William Clay Ford to the administration committee, which was formerly known as the policy committee.

Form School Bus Body Makers Group

A group of eight major manufacturers of school bus bodies recently organized an unincorporated voluntary trade association to be known as the School Bus Body Manufacturers' Association. The companies comprising the charter membership are: Blue Bird Body Co., Carpenter Body Works, Inc., Hackney Brothers Body Co., Hicks Body Co., Inc., Oneida Products Corp., Superior Coach Corp., P. A. Thomas Car Works, Inc., and Ward Body Works, Inc. John H. Shields, president, Superior Coach, was elected the first president of the Association, and A. L. Luce, general manager, Blue Bird Body, was elected vice-president.

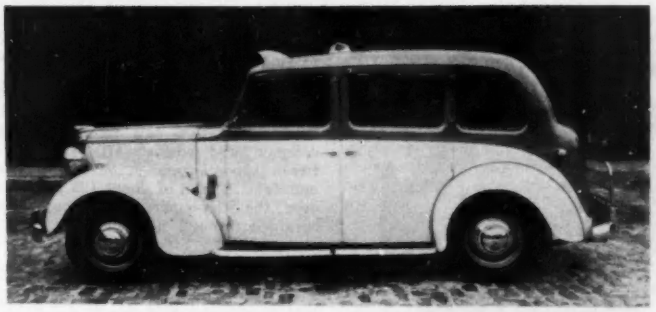
British Protest Hike in Gasoline Tax

A howl of protest has gone up from all British automobile interests at the government decision to place an additional tax of practically nine cents per American gallon on gasoline and other light oils and on heavy oils used as road fuel. This brings up the retail price of gasoline to 3 shillings per Imperial gallon, or 34 cents per American gallon. At the same time the amount of gasoline allotted to the private automobile owner will be doubled, so as to allow him to run about 180 miles per month, instead of the present 90 miles. The 33⅓ per cent purchase tax, which up to the present has been applied only to passenger cars, is now applicable to trucks, buses, and coaches.

Fisher Body Again Adds to Grand Rapids Plant

GM's Fisher Body Div. has announced a second expansion of manufacturing facilities at its Grand Rapids operation. The division has acquired one of the manufacturing buildings of the Haskelite Manufacturing Corp. containing 290,000 sq ft of floor space. The building will be used for expanded cut-

INDUSTRIES



DIRECT FROM LONDON

Introduced by the Austin Motor Co., Ltd. (England), this is the first English taxicab of the London-type to appear in New York. Powered by a 70-hp, four-cyl overhead valve engine, the five-passenger cab has a wheelbase of 110⅝ in., and an overall width of 64 in.

ting and sewing operations and eventually 500 persons will be employed there. Previously, Fisher had announced a 189,000 sq ft addition to its Grand Rapids stamping plant. The company has also announced that T. Clinton Fletcher has been appointed resident manager to succeed Frank B. Harrington, who will retire.

Ford Picks Two Outsiders as Members of Board

For the first time in history, Ford has gone outside the company for directors who are neither stockholders nor executives. The board has been increased by two members—Donald K. David, dean of the Harvard Business School, and James B. Webber, Jr., vice president, general manager, and a director of J. L. Hudson Co., Detroit's largest department store. Both men are trustees of the Ford Foundation which currently owns 2,803,809 nonvoting shares of Ford stock representing 81.2 per cent of the total outstanding shares.

Chrysler Had $1.7 Million Loss for First Quarter of 1950

Reflecting the effect of the 99-day strike, the Chrysler Corp. reported sales for the first quarter of 1950 of $190,702,414 which resulted in a loss of $1,782,790. For the comparable three months of 1949, sales were $401,-245,547 and net earnings $13,731,583 excluding foreign dividends of $4,976,-368. Sales of Plymouth, Dodge, DeSoto and Chrysler cars and Dodge trucks were 109,731 units for the three months ended March 31, 1950, as compared with 242,104 vehicles for the first three months of 1949.

GM of Canada Plans More Expansion

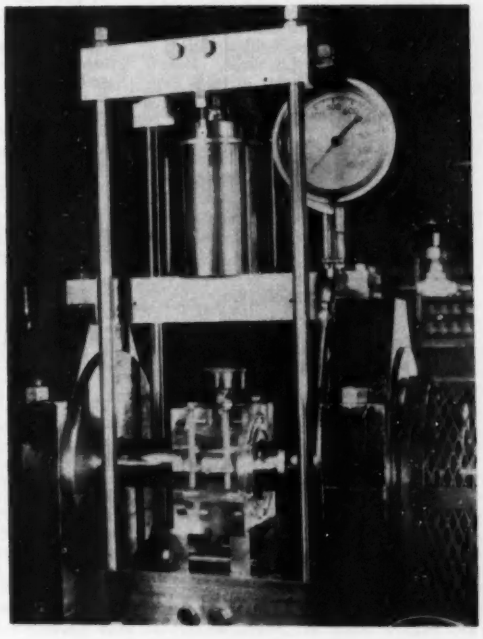
Expansion of facilities this year by GM of Canada involves a building program estimated at close to $5 million. At Oshawa, GM contemplates the erection of a $346,000 addition to its west plant which will cover 57,000 sq ft. Construction of the two-story steel and brick structure will commence shortly. Expansion at the Windsor engine plant of GM calls for an additional 14,000 sq ft of floor space at a cost of $90,000. Two other projects already announced are the $3 million factory parts and accessories warehouse for Oshawa and a new combined parts and accessories warehouse and district office at Montreal costing $700,000.

K-F Promotes Babbitt to Vice President

Kaiser-Frazer Corp. has promoted Hal Babbitt, director of public relations, to vice president. He joined K-F in 1946 and was named director of public relations the following year.

France to Operate Largest Wind Tunnel in Europe

France is about to put into operation the biggest aeronautical wind tunnel in Europe and perhaps in the world. Erected near Modane, at an altitude of 3600 ft above sea level, and about three miles from the Franco-Italian frontier line, the tunnel has a length of 1280 ft and a diameter of 79 ft, decreasing to 26 ft in the test chamber. The two hydraulic turbines, developing 110,000 hp will be started at the end of June, and the tunnel should be in operation a few weeks later. The two turbines,

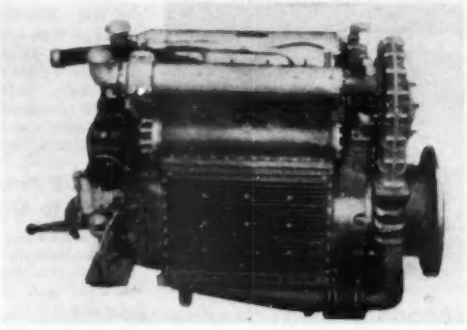


CLEAR TEST

Designed and built at the Texas Co.'s research laboratories at Beacon, N. Y., this special test machine and transparent Lucite bearing is being used for lubrication studies. Using this unit, engineers can see and photograph the behavior of oils and greases in bearings under different loads and speeds. Bright red dye is mixed with the lubricant so that the lines of flow can be followed, and sensitive scales on the test machine measure the friction drag.

News of the AUTOMOTIVE

SUPER-CHARGED MIDGET



This Offenhauser Midget engine, manufactured by Meyer & Drake Engineering Corp., Los Angeles, is the powerplant for a three-quarter racing car entered for the Indianapolis race by Murrell Belanger, Crown Point, Ind. A three-quarter racer is about three-quarters the size of a full size Speedway car, and is designed for one-quarter to one mile paved or dirt tracks.

with a diameter of 14 ft, operate two 15 ft fans, revolving in opposite directions, giving an air velocity in the tunnel of approximately 745 mph.

Willys Starts Shipment of Underwater Jeeps

Willys-Overland has made its first shipment of an order for Jeeps equipped to operate under water to the Navy under a contract totaling more than $3 million including radios and parts. The Jeeps are equipped with deep water fording equipment which enables them to operate completely submerged. All are equipped with two-way radio equipment.

Convair Expanding Facilities at San Diego, Calif.

Consolidated Vultee Aircraft Corp. is expanding its San Diego, Calif., facilities to handle a B-36 modification program. Over $1 million is expected to be spent to accommodate modernization work on the bombers. Installation of jet units and new 3500-hp piston engines is included in the project aimed at improving B-36 performance.

Hudson Appoints Rust Merchandising Chief

Hudson has announced the appointment of A. F. Rust, used car manager for the last year, as merchandising manager. He has been associated with the automobile industry for 23 years including service with Chevrolet and Gabriel Mfg. Co.

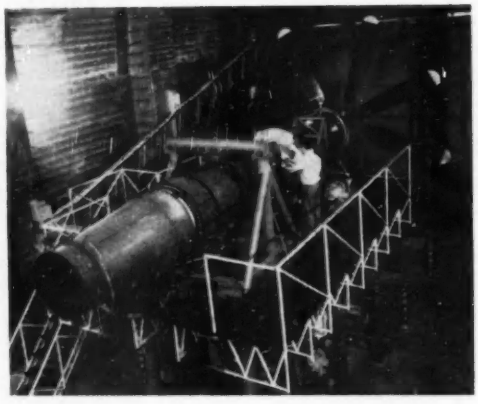
Supercharged Midget Engine in Indianapolis Race

The supercharged Offenhauser Midget engine made by Meyer & Drake (see cut on this page) is similar to those used by the many midget racers throughout the country, except that a centrifugal supercharger has been added. The condensed specifications of the engine are as follows:

Type	4-cyl. in line
Bore	3.0625 in.
Stroke	3.625 in.
Displacement	107 cu in.
Compression ratio	8½ to 1
Supercharger pressure	up to 28 psi
Horsepower	over 275 at 7000 rpm.
Fuel used	methanol blend

The basis engine design follows general racing practice. Overhead camshafts, single intake and exhaust valves, a semi-spherical combustion chamber in this job, an extra heavy three-bearing crankshaft, a dry sump base, and a nickel cast iron cylinder block are some of the principal features. The supercharger is mounted at the rear of the engine directly behind the cylinder block, similar to the Meyer & Drake 176 cu in. engine. (See page 46, April 1st AUTOMOTIVE INDUSTRIES.) The drive is taken off the crankshaft through a three-gear train, the driving gear spring loaded for control of impeller shock. The impeller is 8¾ in. diam with an engine ratio of 5.5 to 1. A lower ratio also is provided. Two carbureters are mounted on a common inlet, with an after-cooler between supercharger outlet and intake manifold. A gain of about 125 per cent over the non-supercharged engine is obtained through supercharging.

SHAFT DELIVERY



Developed by the Turbodyne Corp., Hawthorne, Calif., what is described as the world's most powerful aircraft-type engine, the USAF's XT-37 Turbodyne is shown here for the first time, assembled with its giant counter-rotating propeller, gearing mechanism and controls needed for actual flight installation. The 10,000-hp Turbodyne is similar in operation to turbo-jet type engines, but delivers its power on a shaft.

K-F Expects to Show Profit for 1950

Kaiser-Frazer is looking forward to the last six months of this year for peak production and sales to put the company into the black for 1950. Production and sales are expected to climb to between 160,000 and 180,000 cars this year, with daily volume at an all-time high by late summer. The company has been doing a drastic reorganization job on its dealer organization and has cut the number to 2600 from nearly 5000. As further evidence of the overhauling the entire sales organization is undergoing, the company has revamped its set-up to create four new national sales divisions.

Headlamp Makers Cleared of Monopoly Charges

Five large manufacturers of automobile lighting equipment have been acquitted on charges of monopoly in federal court at Detroit. General Motors, C. M. Hall Lamp Co., General Electric Co., Electric Auto-Lite Co. and Westinghouse Electric & Mfg. Co. were held innocent on charges brought by Orville Stamm, president of Stam-O-Lite, Inc.,

of Chicago, alleging unlawful restriction of trade through refusal of the defendants to manufacture a headlamp anti-glare device invented by Stamm. The court ruled there was no evidence of anti-trust laws violations.

GE Develops Periscope for Watching Jet Exhaust

The General Electric Co. has developed a water-cooled 12-ft periscope for watching the pattern of burning gases in the 2500-deg exhaust blast of a jet engine. The periscope is jacketed in thick stainless steel, beneath which there is a 45 gpm water-cooling system.

GM Expanding Two Assembly Plants

GM is expanding its B-O-P assembly plants at Southgate, Calif. and Atlanta, Ga. The greatest expansion will be at the Southgate plant where 250,000 sq ft of floor space will be added to relieve congestion and provide greater flexibility. The plant at Atlanta, was built after the war and is already proving too small for the operations planned for it; consequently an additional 70,000 sq ft of space will be added to provide two additional assembly bays near the body and paint shops. Construction on both projects is expected to be finished by the middle of November.

Boeing Tooling for More Stratojets at Wichita

Tooling for additional production of B-47 swept-wing Stratojet bombers is now underway at the Wichita (Kansas) Div. of the Boeing Airplane Co. following the receipt from the U. S. Air Force of an order for "substantial" additional numbers of the aircraft.

ASA Announces Four Standard Gray Finishes

Following a consensus reached by 18 organizations and groups representing all classes of manufacturers and users of such equipment, the American Standards Association has adopted four accurately defined grays as standard finishes. The new standard is called "Gray Finishes for Industrial Apparatus and Equipment" (ASA Z55.1-1950).

K-F Moving Convertible Assembly to Jackson

Kaiser-Frazer is moving final assembly and trim of the Frazer convertible and the Manhattan four-door hardtop to Jackson, Mich. The company is tooling a section of its parts and service warehouse there to handle the two lines and production will begin about June 5. The move will release production capacity at Willow Run which will be used for increased output of the company's other models. Initial output at the Jackson operation is expected to be about 10 units a day.

Northrop Gets $52 Million USAF Contract for F-89's

Northrop Aircraft, Inc., is preparing speeded production of F-89 all-weather interceptors for the U. S. Air Force as a result of a new order for an undisclosed number of the planes. The airframe contract price was set at more than $52 million, bringing the backlog of unfilled military orders to over $100 million, according to the company.

Small Businesses Prosper With Automobile Industry

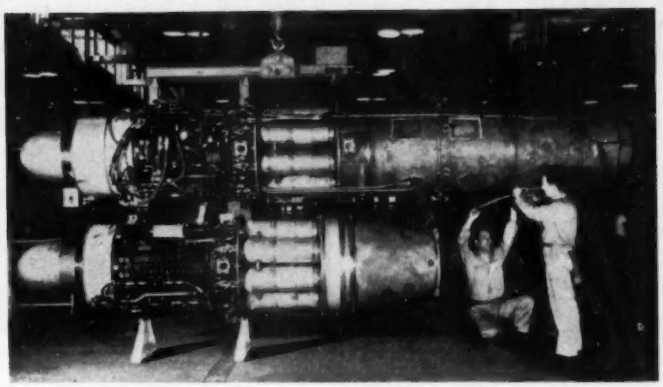
The Automobile Manufacturers Association, in its May issue of *Automobile Facts*, cites some interesting figures to show the effect of the giant automobile manufacturing industry on small business. It points out that many businesses that do not fall strictly within the automobile manufacturing classification benefit, such as radios of which more than $100 million worth were installed in automobiles last year. Other items are clocks valued at $13 million, more than $70 million worth of woolen fabrics, and felts totaling more than $2.6 million. Other interesting items related to the automobile business are the garage door industry doing a business of $7 million a year and automobile body polish accounting for an estimated $110 million annually.

GM Ordering Equipment for Technical Center

GM is apparently not waiting for the completion of the first unit of its technical center before acquiring new and modern equipment. Much of the equipment that will be used in the new laboratory is being purchased and installed in the GM Research building and will be moved to the new location when it is completed.

GM Set New Records in First Quarter

GM set record-breaking highs in productions, sales, and net income in the first quarter of 1950. Net sales for the quarter totaled $1,642,659,449, compared with $1,282,324,474 in the first quarter of 1949. Net income in the first quarter of 1950 was $212,387,765, while for the first quarter of 1949 net income was $136,763,338. Sales to dealers and overseas shipments of cars and trucks produced by GM plants in the U. S. and Canada totaled 865,756 in the first quarter. Unit sales were 54 per cent over sales in the first quarter of 1949.



BURNS MORE

Compared with a current GE J-47 production model jet engine, the new elongated General Electric jet engine, shown above, burns additional fuel in a "reheat" burner in the tail, increasing its thrust. It has a special nozzle at the end of the tailpipe through which exhaust gases are discharged.

RADIAL LOADS & THRUST
From Any Direction

Taken by ONE
Single Row Ball Bearing
(either sealed-for-life or plain)

One easily applied, unit bearing, requiring no adjustment, provides ideal radial support and axial location in both directions for an infinite variety of shaft mountings. If a ball bearing is used at the other end of the shaft, it floats — takes radial load only. Or the other bearing may be a plain bushing, or any radial, anti-friction type the designer may elect. No headaches over shaft expansion or normal machining errors.

Check into this for greatest simplicity and economy in your designs. The famous New Departure rear wheel bearing* on leading cars is an example. . . . Remember — no other bearing not of dual type or not used in opposed pairs can equal this load service.

Nothing Rolls Like a Ball

*Send for booklet RW showing this application.

NEW DEPARTURE BALL BEARINGS

NEW DEPARTURE • Division of GENERAL MOTORS CORPORATION • BRISTOL, CONNECTICUT BRANCHES IN ALL PRINCIPAL CITIES

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers.

Ford Motor Co.—The election of **Donald K. David** and **James B. Webber, Jr.**, to the Board of Directors has been announced. Appointment of **Maynard T. Murray** as manufacturing manager of the General Manufacturing Div., has been announced. Announcement has also been made of the appointment of **William C. Ford** as a ber of the Administration Committee. **H. G. English** has joined the company's engineering staff as assistant to **R. F. Kohr**, Research Engineer. **V. J. Jandasek**, who was assistant to Mr. English at Borg-Warner, has also joined the Ford Company in a similar capacity.

Hudson Motor Car Co.—The appointment of **A. F. Rust** as merchandising manager has been announced.

Chrysler Corp.—**James C. Zedar** has become Director of Engineering and Research with over-all responsibility for coordinating and directing engineering and research activity.

Kaiser-Frazer Corp. — **Hal Babbitt**, director of Public Relations, has been elected a vice-president.

Bendix Aviation Corp. — **C. Stewart Ferguson** has been appointed technical director of the Marshall-Eclipse Div. of the company at Troy, New York. He was formerly associated with General Electric Co. **Dr. Albert C. Hall**, of the Massachusetts Institute of Technology has been appointed associate technical director of Bendix Aviation Research Laboratories at Detroit.

Northrop Aircraft, Inc. — **Roland J. Pagen**, Treasurer and Controller, was elected vice-president and director of finance and accounts. **George T. Johnson** was appointed Controller. **James W. Roche** has been made supervisor of customer field service.

Piasecki Helicopter Corp.—**Frank N. Piasecki** has been elected to the newly created office of Chairman of the Board. **C. Hart Miller** was elected President. The following officers were also elected: **W. R. Frysztacki**, Vice-Pres.-Secretary; **H. S. Pack**, Vice-Pres.; **Elliott Daland**, Vice-Pres., Research and Development; **William Palmer**, Treasurer, Controller and Asst. Secretary.

Boeing Airplane Co.—The election of **A. F. Logan** as Vice-Pres., Industrial Relations, has been announced.

Lockheed Aircraft Corp.—**Wayne D. Cannon** has joined the European sales staff of the company.

Curtiss-Wright Corp.—**Roger Lewis**, formerly Vice-Pres., Sales, Canadair Limited, has been appointed Director of Sales.

Fairchild Engine and Airplane Corp. —Announcement has been made of the appointment of **Floyd S. Bennett, Jr.**, as Treasurer. Mr. Bennett is succeeded as Asst. Comptroller by **P. A. Britner**.

Link Aviation, Inc.—**James F. Newlon** has been named manager of manufacturing engineering in the general engineering dept. and **James F. Miller**, of Chenango ridge, has been appointed plant supt.

Solar Aircraft Corp. — **Herbert K. Krumel** has been appointed manager of contract administration. **C. D. Oberg**, who formerly held the position, has been transferred to San Diego, and will be in charge of all aircraft product sales.

Aeronca Aircraft Corp.—Announcement has been made of the appointment of **Gordon Hileman** as Asst. Sales and Service Manager.

Lear, Incorporated—At the annual meeting of the company, the following new directors were elected: **Russell A. Stevenson**, **John W. Dregge** and **Dean C. Smith**.

Fisher Body Div., General Motors Corp. — Appointment of **T. Clinton Fletcher** as resident manager of the stamping plant, Grand Rapids, has been announced.

Borg-Warner Corp. — **Roy C. Ingersoll**, previously Vice-Pres., was elected President, succeeding **C. S. Davis**. Mr. Davis was elected to the newly created office of Chairman of the Board. **B. A. Shallberg** was named chairman of the executive committee. A new vice-president, **A. P. Emmert**, president of the corporation's Warner Gear Div., was also announced. The election of **R. W. Dose** as Secretary, was announced. **Mathew Keck** was re-elected Treas., and **L. J. Heidgen** was named Asst. Secretary and Asst. Treas.

The Autocar Co.—**David N. Miller** has been made Cincinnati Branch Manager for the company.

(*Turn to page 67, please*)

CALENDAR

OF COMING SHOWS AND MEETINGS

Conventions and Meetings

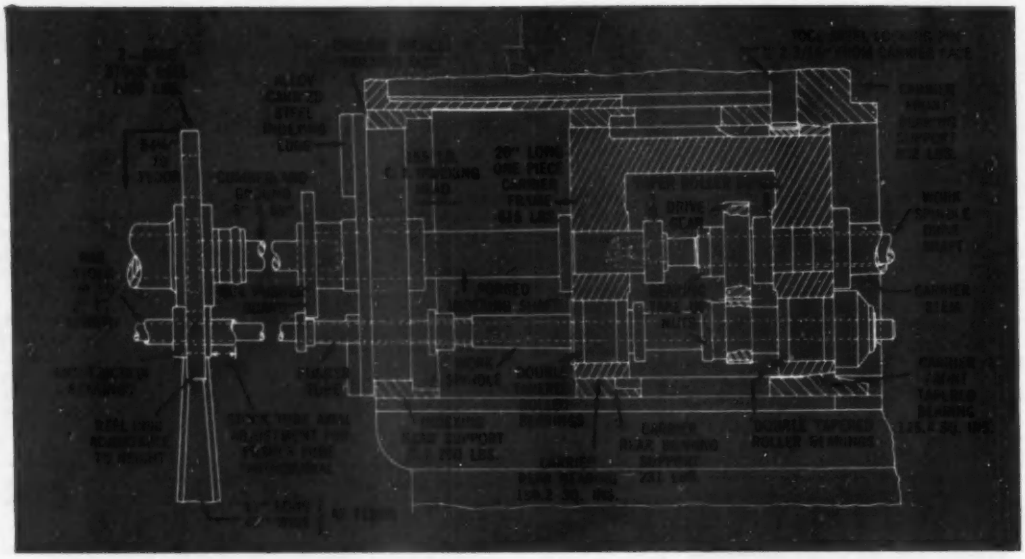
World Transportation Fair, Los Angeles .....May 10-Sept. 9
Automotive Engine Rebuilders Assoc. Annual Convention, St. Louis.May 18-19
Soc. for Exper. Stress Analysis, Cleveland .....May 25-27
International Trade Fair, Toronto May 29-June 9
Amer. Society for Quality Control, Fifth Midwest Conference-Annual Convention, Milwaukee, Wis...June 1-2
Amer. Gear Mfrs. Assoc., Hot Springs, Va. .....June 4-7
SAE Summer Mtg., French Lick..June 4-9
Amer. Electroplaters' Soc. Convention, Boston .....June 12-16
Amer. Soc. Mech. Engineers, Nat'l Mtg., Chicago .....June 12-16
Nat'l Truck, Trailer & Equip. Show, Los Angeles .....June 22-25
A.S.T.M. Annual Mtg., Atlantic City June 26-30
International Trade Fair, Chicago.Aug. 7-19
SAE Nat'l West Coast Mtg., Los Angeles .....Aug. 14-16
SAE Tractor Mtg., Milwaukee.....Sept. 11
Nat'l Assoc. Motor Bus Operators Annual Mtg., Chicago.....Sept. 13-15
Instrument Soc. of Amer. Conf. & Exhibit, Buffalo .....Sept. 18-22
SAE Nat'l Transportation Mtg., New York City .....Oct. 16-18
Nat'l Safety Congress, Chicago Oct. 16-20
Society of the Plastics Industry Nat'l Conference, Swampscott, Mass. Oct. 18-20
Amer. Society for Metals' Annual Nat'l Metal Congress & Exhibition, Chicago .....Oct. 23-27
Amer. Welding Soc. Annual Mtg., Chicago .....Oct. 23-27
Nat'l Lub. Grease Inst., Chicago Oct. 30-Nov. 1
Amer. Soc. Body Engrs. Technical Convention, Detroit .....Nov. 1-3
Soc. of Plastic Engrs., New York City Jan. 18-20

Necrology

Roy E. Cole, 63, retired vice president in charge of engineering, Studebaker Corp., died in South Bend, Ind., on April 19.

L. D. Holland, 46, assistant to the president and a member of the board of directors, E. F. Houghton & Co., Philadelphia, died on April 14.

Frank A. Tichenor, 69, publisher and editor of the *Aero Digest*, died on May 4 in Greenwich, Conn.



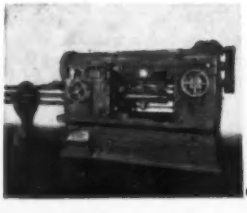
FIRST THINGS COME FIRST

Upon the Spindle Carrier of an "Automatic" falls the responsibility of accurately presenting and holding the work to — and in contact with — the tools. The basic design of the Carrier is obviously of first importance in the protection of the work spindles from the strain of heavy cuts and weight of the bar stock. Then, in proportion to the Carrier's ability to handle the full load is the importance of any supplementary facility that shares the load.

1. **The 1½" Six Spindle CONOMATIC CARRIER gives better support to the work spindles under heavy loads.** — *The thick, heavy ribs resist strain. The tapered front bearing and the spindle drive gears are within 3" and 9¼", respectively, of the collet faces. The wider spaced bearings give better alignment and load distribution. The Carrier is free of Cross Slide positive stop pressure.*

2. **The entire INDEXING MECHANISM is supported by the Top Bed as well as the Base. There are fewer wearing parts.** — *The Indexing Head takes the brunt of the indexing load. It is supported by the short frame member midway between the Carrier and the Stock Reel. It is joined to the latter by strong center shafts.*

3. **The STOCK REEL is designed to handle longer and heavier loads.** — *The two Stock Reel Bases are independent of the machine and relieve it of the heaviest part of the bar load during the cutting and indexing movements. Adjustable alignment gives freer stock-feed action.*



Buyer's Comparison Chart will guide you to full information

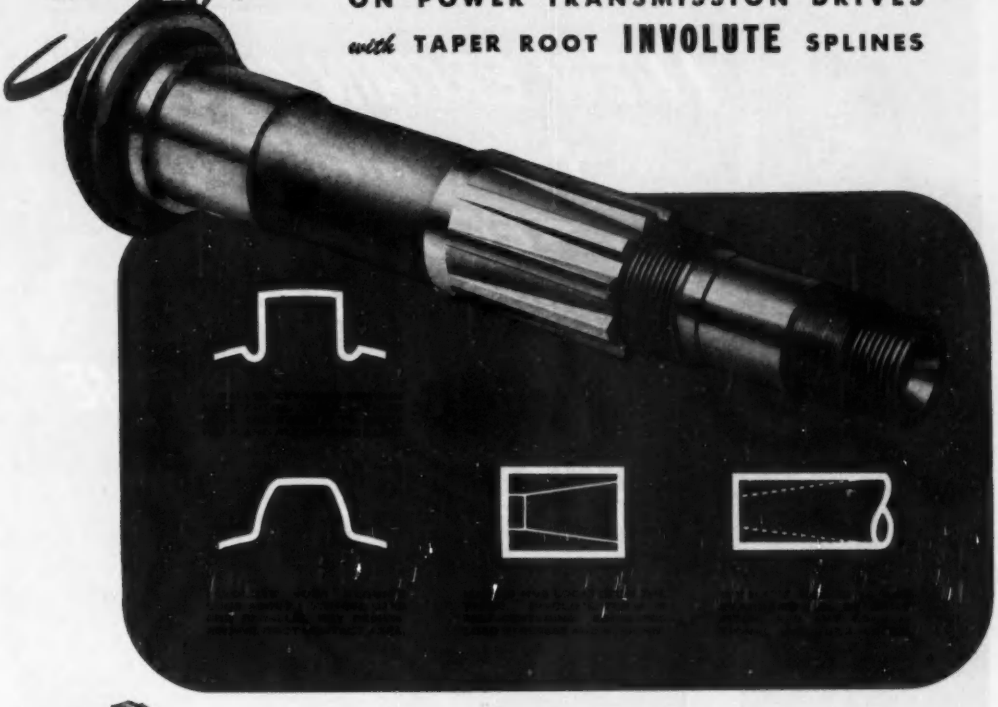
A Comparison of ALL Automatics is in Favor of Cone

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

Solve THESE DESIGN PROBLEMS

ON POWER TRANSMISSION DRIVES *with* TAPER ROOT INVOLUTE SPLINES



Write: By using Taper Root Involute Splines, power transmission drives can be produced more practically, at a cost that permits a profit. Write today for information on how to produce them easily, rapidly and economically with Barber-Colman Hobs and Machines. Address requests for estimates to Department 7620.

1 SHORT LENGTH, SOLID FIT
Taper Root Involute Splines seldom require a length more than equal to the pitch diameter, which is sufficient for carrying any potential load.

2 RESIST TORSIONAL STRESS
Taper Root Involute Splines offer about 50% more root contact area than parallel key mounts. Tests prove the strength of this Design equals that of a solid shaft, slightly larger in diameter than the root diameter of the spline.

3 EASY MACHINING, LOW TOOLING COST
Taper Root Involute Spline Hobs have more teeth, remove less metal per tooth space, and run at faster RPM's than parallel key hobs. Tool life is longer because clearance lugs are reduced.

4 LOCATING SHOULDERS ELIMINATED
Taper Root Involute Splines locate against the taper and are thereby self-centering. Equalized bearing and stresses result on all teeth.

Barber-Colman Company

GENERAL OFFICES AND PLANT, 7620 LOOMIS STREET, ROCKFORD, ILLINOIS, U.S.A.

A Typical Case of New Britain "AUTOMATIC" ECONOMICS

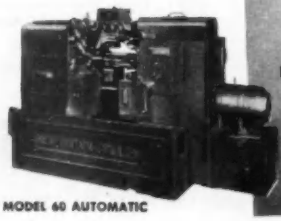
UNTIL this manufacturer invested in a New Britain six spindle automatic, work on small pistons involved four men and two turret lathes. Hit or miss accuracy and time-consuming hand operations to finish a critical taper boosted his costs.

Now the one automatic has freed the four men and two lathes for other work. It requires only half the time of one regular operator and delivers up to 465 completed pieces per hour, with a "smooth and true" taper as specified.

The direct labor savings alone are justifying the machine investment, paying for the New Britain within a year!

No manufacturer can afford *not* to invest in a machine that can lower production cost per piece. Obsolescence, not wear, is the determining factor in machine replacement. The current trend toward over-age machinery is endangering not only the profit picture in the individual plant, but the safety and prosperity of the whole nation.

"It Can Be Done", a brochure of up-to-date cost histories on specific pieces, points the way. May we send you a copy? Call in your New Britain Sales Engineer for help in discovering profit opportunities in your shop's metalcutting.



NEW BRITAIN MODEL 60 AUTOMATIC

NB

NEW BRITAIN

Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

450 HCI

THE ECONOMICAL OIL SEAL FOR LIMITED SPACE APPLICATIONS

VICTOR VICTOPRENE TYPE K3

for Shafts up to 2-inch Diameter

TAKES LESS SPACE AXIALLY AND RADIALLY

This modern Victoprene oil seal fits the most compact shaft assemblies. Minimum over-all dimensions of K3 seals in all sizes eliminate the usual problem of adequate housing space.

ONE-PIECE MOLDED CONSTRUCTION

Extreme compactness means no sacrifice of sealing efficiency. Sustained high performance is assured with a specially developed construction. The Victoprene sealing element and metal channel are molded into one integral unit, with a continuous coating of Victoprene on face and outer periphery.

SUITED FOR WIDE APPLICATION

Victoprene has the highest rating for resistance to lubricants, heat, and aging. It meets the needs of most sealing services as proved in countless applications. Structurally, K3 seals have withstood the severest tests in laboratory and field.

GET THIS DESCRIPTIVE CIRCULAR

Sizes, dimensions, service recommendations and installation data on K3 seals are given in Circular S-790, sent on request. Write direct, or ask your Victor Field Engineer for a copy. No obligation.

Victor Manufacturing & Gasket Co., *and its affiliate* Victor Sealing Products Co. Inc., P. O. Box 1333, Chicago 90, Illinois.

7 Features of the K3 Thin Seal

supplied with or without garter spring

1 .250" **OVERALL WIDTH IN ALL SIZES,** maintained to plus or minus .015". Available currently for shaft diameters from .312" to 2.000".

2 **IMPROVED VICTOPRENE SEALING ELEMENT** retains full efficiency at all shaft surface speeds up to 3000 F.P.M. and at temperatures from minus 40 deg. F. to 275 deg. F.

3 **NEW ONE-PIECE MOLDED CONSTRUCTION**—Sealing element is simultaneously molded and permanently bonded with metal channel to form one integral unit. Continuous coating of Victoprene on face and outer periphery of body provides effective sealing at these points.

4 **GREATER FLEXIBILITY — LESS FRICTIONAL DRAG**—Hammerhead design (limited contact of sealing face) with its adjoining thin wall section provides maximum flexibility in sealing element action, with minimum drag on shaft.

5 **NON-SHIFTING SPRING TENSION**—Type K3 seals equipped with garter spring have a molded "V" groove in sealing element which holds spring in proper location to maintain uniform pressure around the shaft.

6 **EASY TO INSTALL**—A rigid frame for installing the seal is provided by the integral metal channel. The tapered lead-in on the toe side of outer periphery locates the seal and permits easy entrance into the bore. General procedure for pressing into bore is the same as for metal encased seals.

7 **PERMANENT IDENTIFICATION** appears on the face of each TYPE K3 seal, giving the catalog number, shaft size, and the name "Victor."

VICTOR GASKETS AND OIL SEALS

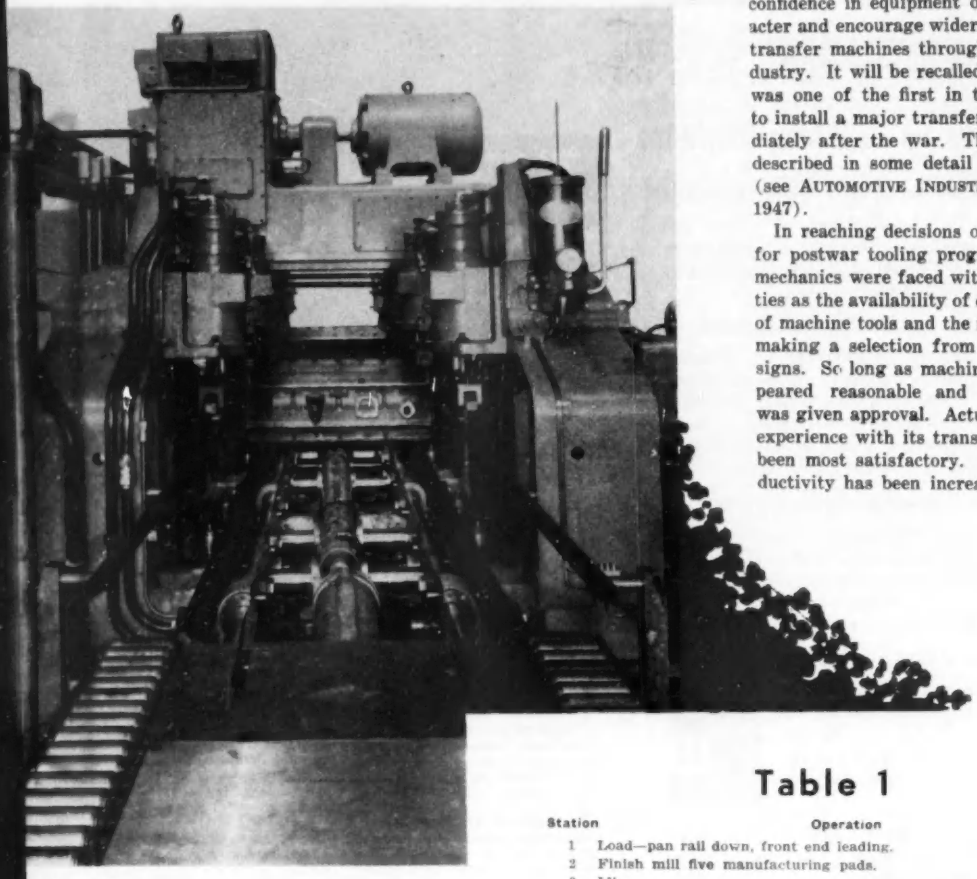
VICTOR

Buick's Newest Transfer Line

By Joseph Geschelin

THE many advanced features embodied in the transfer machine line recently installed by Buick for machining 1950 Super engine cylinder blocks should repose greater confidence in equipment of this character and encourage wider adoption of transfer machines throughout the industry. It will be recalled that Buick was one of the first in the industry to install a major transfer line immediately after the war. That line was described in some detail at the time (see AUTOMOTIVE INDUSTRIES, Feb. 1, 1947).

In reaching decisions on equipment for postwar tooling programs master mechanics were faced with such realities as the availability of certain types of machine tools and the necessity for making a selection from existing designs. So long as machine design appeared reasonable and practical, it was given approval. Actually, Buick's experience with its transfer lines has been most satisfactory. In fact productivity has been increased progres-



Close-up of the 13-station W. F. & John Barnes machine, showing cylinder blocks moving on the conveyor in sidewise aspect for machining of both ends simultaneously. The overhead-mounted hydraulic system may be seen clearly in this view. At the extreme right corner of the unit may be seen the Farval automatic lubricating system for the fixture.

Table 1

Station	Operation
1	Load—pan rail down, front end leading.
2	Finish mill five manufacturing pads.
3	Idle.
4	At this point a turn-over fixture lays case on four end locating spots for milling the pan rail with three cutters; rough-milling bearing cap clearance with a pair of side mills; and rough-milling the bearing cap seat with an end mill.
5	The case is unloaded from Station 4, reloaded in the fixture and is then rough- and semi-finish-milled on the top face.
6	Unload from fixture and transfer to Station 7.
7	Load case in fixture and finish mill pan rail.
8	Unload from Station 7, reload in fixture, finish-mill and broach bearing cap seats.
9	Unload from Station 8 and transfer to Station 10.
10	Load in fixture, drill, chamfer, and ream two locating holes.
11	Rough- and finish-mill valve cover face.
12	Unload.

for Machining Cylinder Blocks

Simplification of the Process, Greater Automaticity, and Higher Productivity Due to the Ability of New Equipment to Remove Metal at Higher Speds and Feeds Are Found in Buick's Setup for Machining Cylinder Blocks for the 1950 Super Engine

sively and maintenance experience has been quite acceptable.

Buick has learned a lot about transfer machines during the past two years or more. Moreover, the past three years have seen cooperative effort on the part of machine tool builders and users in the development and adoption of the so-called JIC (Joint Industry Conference) electrical and hydraulic standards. In fact, the JIC work has caused a reversal of machine design in certain respects. Our readers will recall that some years before the war there was a definite trend to streamlining of everything including machine tools. Automobile plants were always show places and the push then was to nicety of form and eye appeal rather than functionalism.

This resulted in handsome appearing machinery with nicely formed contours, encouraging concealment of all piping and wiring and drives. Motors, drives, valves, and controls were placed within the structure. While this satisfied the esthetic senses, it created headaches for the maintenance people since it was sometimes necessary to lift an entire machine in order to reach a small motor.

The new transfer line to be described here not only is the fruition of

The first machine on the case line is the seven-station Ingersoll milling machine which is made up of individual units. The control panel and loading station are in the immediate foreground. The three cabinets lined up at the right are self-contained hydraulic power units. Electrical equipment is housed on the opposite side with wiring harness leading upward to the ducts above the machines.

accumulated experience on the part of users and machine tool builders but incorporates many of the basic concepts of JIC standards.

To be brief, the new transfer line has the following basic features — in addition to the fact that it is simpler and more compact than the first line:

1—All machine units are of individual type with separate stations and without combining multiple stations within a common enclosed machine.

2—Individual units generally are more massive, more rigid, and heavier to assure accuracy and alignment. Moreover, each unit is completely open so as to expose cutting tools for easy access and replacement.

3—Hydraulic units for each station—motors, pumps, and accessories—are separate from the machine and mounted on the floor near the machine either in a cabinet or entirely exposed.

4—Hydraulic valves, controls, etc., are mounted on the outside of the machine and up off the floor for easy reaching. Plumbing for hydraulic circuits is manifolded right out in the open, running above the floor.

5—Electric wiring is carried overhead outside the machine to control cabinets mounted either above the machine or on the side. Control cabinets are mounted entirely independent of the machine.

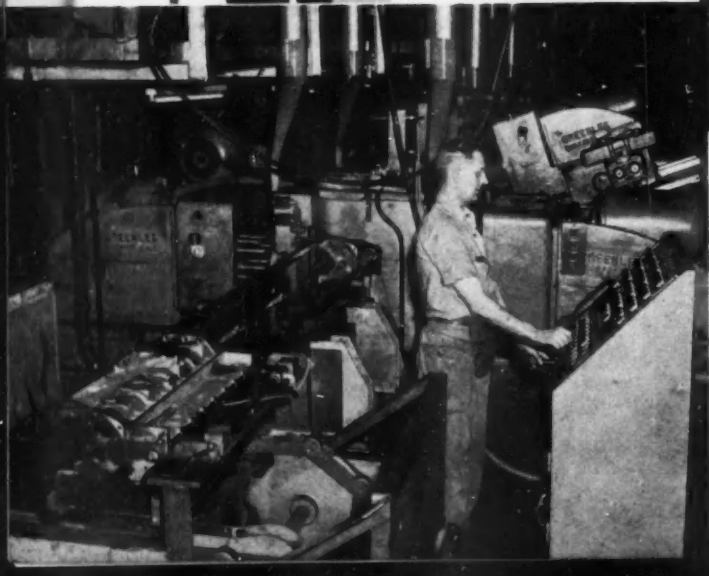
6—All electric motors are mounted externally and accessibly.

7—Limit switches are installed waist-high or higher where they are free from dirt and oil and within easy reach. Moreover, limit switches are fitted with transparent windows to permit visual inspection of contacts.

8—All machines have automatic lubrication; and each major unit contains its own built-in chip conveyor.

9—In addition, the work fixtures generally are completely skeletonized so that work is exposed to the eye. This makes for freedom from chips and dirt and eliminates fouling of guides and locators.

The new Super block is quite similar in most respects to the



Here is a foreshortened perspective of the second six-station, W. F. & John Barnes transfer machine. This too is of two-way type but is built up primarily of angular units. This view emphasizes the accessibility of the electrical wiring system with all leads from the overhead power distribution duct. In this case the hydraulic unit is mounted on a pedestal away from the machine, at the extreme right.

Here is a close-up of the loading end of the second —12-station—Greenlee machine which has a total of 209 spindles in operation. The block at the extreme end may be seen on the conveyor with rear end leading and set on its side so as to present the top and bottom faces.

original block and the sequence of operations follows the same pattern. As a matter of fact the same makes of machines are found on the new line. The big difference lies in a simplification of the process, greater automaticity, and higher productivity due to the ability of the new equipment to remove metal at higher speeds and feeds.

The first stage at the start of the line is a sequence of major milling operations in a multiple-station Ingersoll unit, consisting of individual machines tied together by the sequential conveyor. The outline of major steps is as follows:

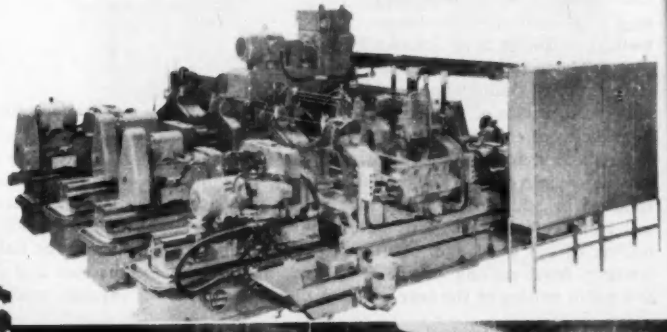
With reference to the foregoing operations, it is important to note that the block is moved on the rails at a speed of 60 ipm past the cutters. Metal removal ranges from a low of ⅛-in. to ¼-in. or more, depending upon the condition of the casting. The unusually high speeds and feeds in this machine are due in part to special cutter design, packing considerably more teeth in the periphery.

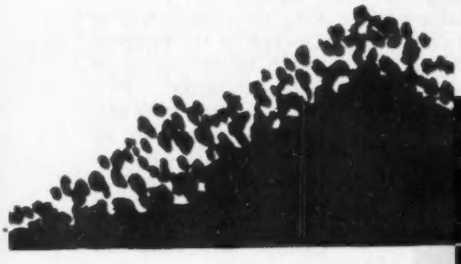
Table 2

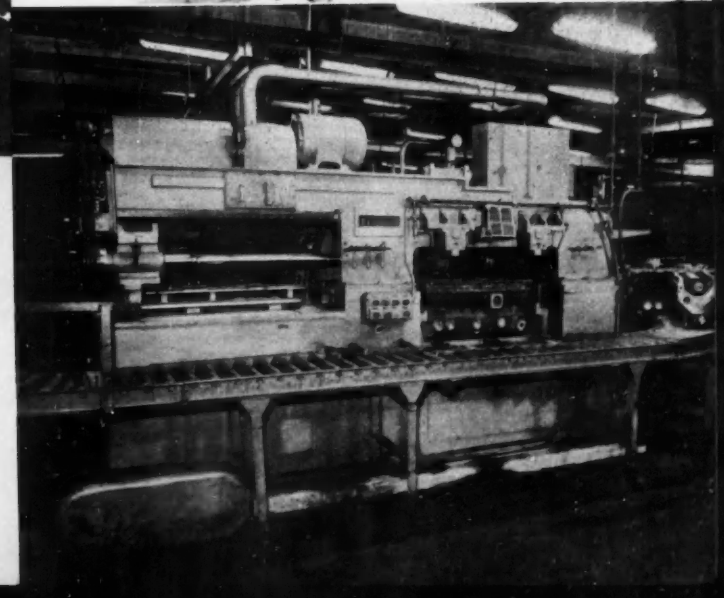
Station	Operation
1	Load block, pan rail down, with rear end to left.
2	RH head—9 spindles. LH head—8 spindles, including one for oil gallery hole.
3	RH head—9 spindles. LH head—3 spindles.
4	RH and LH heads idle.
5	RH head—6 spindles, including one for oil gallery hole. LH head—one spindle for oil gallery hole.
6	RH head—4 spindles; LH head—one spindle.
7	RH and LH heads idle.
8	RH head—spindle for oil gallery hole; LH head—spindle for oil gallery hole.
9	RH head—spindle for oil gallery hole, through. LH head—one spindle.
10	RH and LH heads idle.
11	RH head—2 spindle tap; LH head idle.
12	RH head—3 spindle tap; LH head—3 spindle tap.
13	Unload.

The second W. F. & John Barnes machine, of six-station type, has the following arrangement of heads for operations on the sides of the block:

Station	Operation
1	Load—pan rail up, rear end leading.
2	RH head—12 spindles; LH head—13 spindles.
3	RH head—1 spindle; LH head—13 spindles.
4	RH head—1 spindle; LH head—drill 5 oil holes, crank to cam line, 1⅝ in. deep.
5	RH head—12 spindles; LH head—drill 5 oil holes through or 2⅝ in. deep.
6	Unload.







Perspective view of 13-station W. F. & John Barnes progress—through transfer machine, taken before installation on the floor at Buick. The electrical control cabinet is mounted separately at the extreme right. Note how the wiring is carried in conduit to each station from the power duct in the background. Another noteworthy feature is the independent hydraulic system which may be seen mounted overhead —in the center background—to conserve space.

This big special Ex-Cell-O line boring machine is used for precision boring crankshaft bores.

Transfer Line for Cylinder Blocks

Cutter speed in the Ingersoll is as follows:

Rough-milling the side—202 fpm; finish-milling the side—298 fpm; rough-milling the pan rail—206 fpm; finish-milling the pan rail—304 fpm.

Considering the high cutter and table speeds mentioned above, as well as the heavy metal removal, it is of interest that pan rail flatness, so essential to the maintenance of major dimensions of the block, is held within 0.003 in. Squareness of ends too is held to 0.003 in.

The next step is the rough-boring of the eight cylinder bores in vertical eight-spindle boring machines, followed by additional milling in a six-station Ingersoll transfer machine. This unit handles the rough-milling of the front end, milling the end of the rear bearing, finish-milling of the front end, and rough- and finish-milling of the rear end with planetary heads at stations four and five. The sixth station is for unloading.

Continuing along the line we find two impressive progress-through machines supplied by W. F. & John Barnes, separated by an Ingersoll seven-station combination milling and boring machine, boring station six of the latter machine doing the rough-boring of the cam and crank lines. The first of the progress-through machines is a 13-station battery having 60 spindles altogether. It is illustrated here, using photographs taken before installation on the line so as to provide a good perspective. The second battery is a six-station unit with 66 spindles. Illustrations for both machines were taken before installation on the line to emphasize the electrical wiring system, inde-

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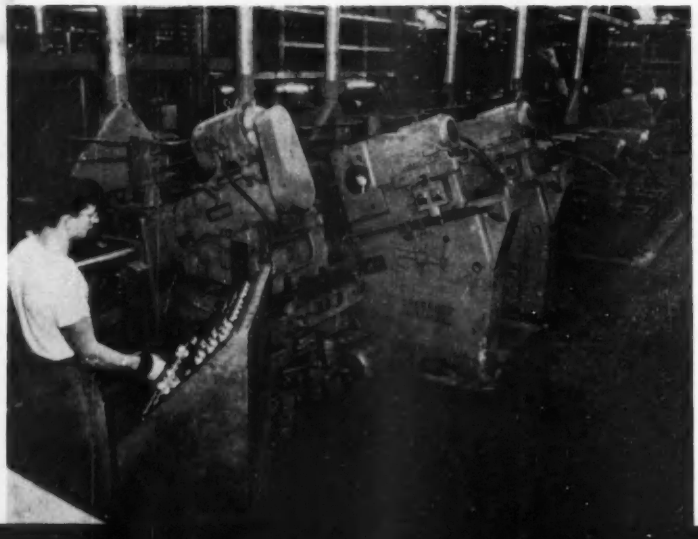
Table 3

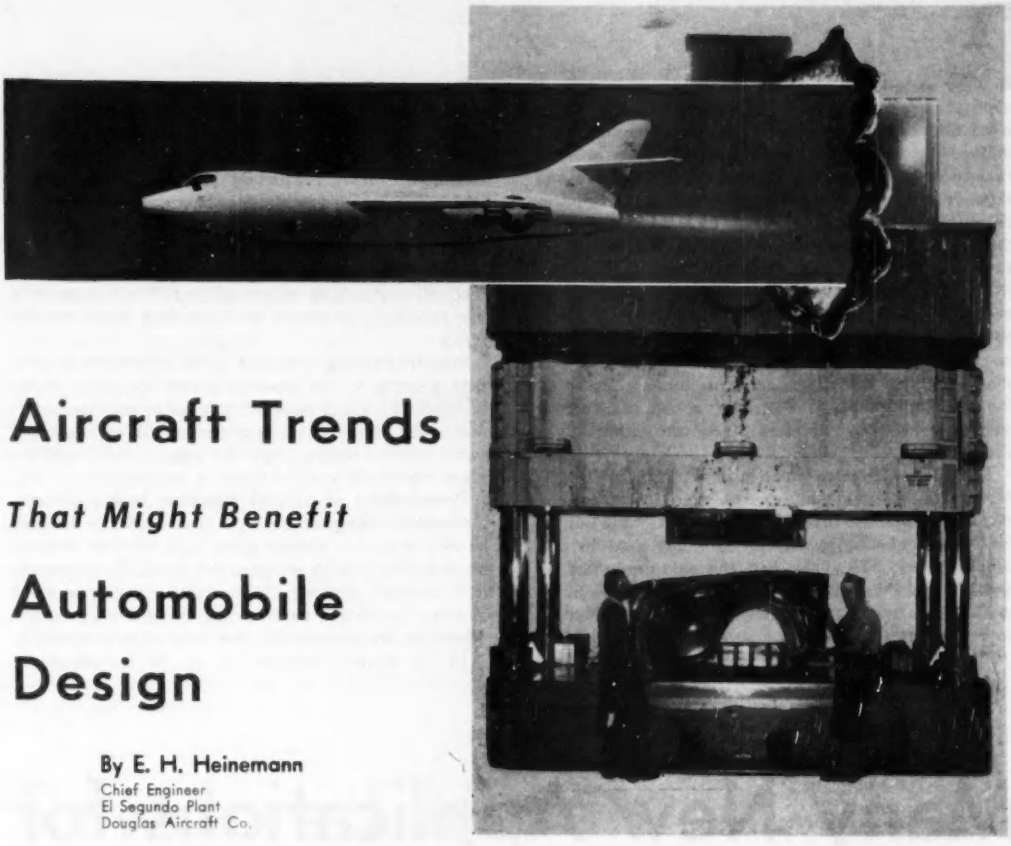
Station	Operation
1	Load with pan rail up, rear end leading. Fixture position block with core hole side down.
2	RH head—mill distributor and number pad. LH head—drill 10 holes.
3	RH head—drill 2 holes. LH head—drill 30 holes.
4	RH head—drill 2 holes; LH head—mill 5 bearing locks.
5	Idle.
6	RH head—chamfer top of cylinder bores. LH head—chamfer bottom of cylinder bores.
7	RH head—drill 23 holes; LH head—drill 5 oil holes.
8	RH head—drill 10 holes. LH head—drill 5 oil holes through.
9	RH head—combination drill and chamfer two holes. LH head—drill one oil hole.
10	Unload.

The second Greenlee transfer machine is of 12-station type, boasting a total of 209 spindles, handling a wide variety of miscellaneous holes and milled pads in the arrangement noted below:

Station	Operation
1	Load with rear end and first core hole side down.
2	RH head—chamfer 22 holes, drill one, ream two. LH head—chamfer 40 holes.
3	RH head—semi-finish ream and counterbore hole. LH head—rough straddle mill and chamfer center bearing; straddle-mill intermediate bearings; face front side rear bearing and rear side of front bearing.
4	RH head—drill 16 valve lifter holes—half way. LH head—drill one hole.
5	Idle.
6	RH head—drill 16 holes through; LH—drill one hole.
7	Automatic chip dumping fixture.
8	RH head—redrill 16 holes; LH—drill one hole.
9	RH head—tap 24 holes; LH—tap 45 holes.
10	Turn-over fixture, turns work pan rail up.
11	RH head—tap 13 holes. LH head—tap 9 holes.
12	Unload.



Loading end of the first 10-station Greenlee transfer machine, having 90 drilling spindles as well as milling stations and stations for chamfering at top and bottom of cylinder bores.



Aircraft Trends

That Might Benefit

Automobile Design

By E. H. Heinemann
Chief Engineer
El Segundo Plant
Douglas Aircraft Co.

An aircraft-type hydraulic press is used to produce fenders for new automobiles by the Western Pressed Metals Div. of the Douglas Co. Flexibility of aircraft production lines permits utilization of aircraft-type presses, drop hammers, and simple zinc dies for the production of a variety of parts that are supplied to the automobile industry.

FOR many years aircraft designers have looked to the automobile industry for manufacturing and engineering ideas, always in the hope of some day approaching the mass production with which the U. S. automobile industry has always led the world.

Aviation has become a mature industry, yet it is quite apparent that comparable mass production in aviation is unlikely, at least in the near future. Aircraft production at best probably will be limited to a small volume of relatively custom built units.

It Is Realized That It Is Impossible to Describe in Detail All Possibilities of Aircraft Influence on Automobile Design in a Single Article. The Author Has Endeavored Here to Point Towards Some Fields of Influence in Order to Stimulate Thought.

It has been suggested that in exchange for the many ideas that the automobile field has contributed to the aircraft industry that the aircraft industry might now reciprocate, since progress in recent years has resulted in extremely advanced aircraft design.

It seems quite doubtful that the aircraft industry will influence motor vehicle design to any great degree, yet it may be profitable to examine a few of the advanced features of aircraft design in this light. To this end let us attempt to summarize some of the aircraft trends that might be of benefit to automobile designers, while realizing that incorporation of new ideas must be tempered by the usual consumers market surveys, styles, costs and competition.

Safety Is Main Consideration

Perhaps the strongest connection between aircraft and automobile design is in the consideration of safety. Safety has always necessarily been the first

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Many New Applications for

POWDER metallurgy is an old art with mass production applications such as oil-less bearings going back almost 30 years. In recent years the technique has evolved by leaps and bounds, enriched by a wide variety of metal powders, alloys, and mixtures; and expanding into an almost endless diversity of applications. Table 1 is a summary of many parts made by this process, including gears and sleeve bearings for automotive engines.

As indicated in an article on Amplex Manufacturing Co. (see AUTOMOTIVE INDUSTRIES, Nov. 1, 1949) powder metallurgy has projected into the field of machined parts, replacing parts hitherto made by other methods including screw machines. Moreover the art now affords a choice of useful non-ferrous metals as well as stainless steels and other high-tensile alloys.

The war, which gave greatest impetus to the diversification of powder metal parts, also encouraged a major development of sintered metal friction linings for heavy duty equipment of all kinds used by the armed forces. This has had the salutory effect of spreading the use of friction materials in the automotive industries, particularly in its application in automatic transmissions.

Powder metallurgy—essentially a mass production art—has many important advantages over conventional methods for the manufacture of certain types of parts. For one thing, overall production economies can be effected on parts properly selected for this technique. It is frequently possible to make parts which require no machining whatever, since they can be produced to almost any form, with gear teeth or cam shapes, with holes and slots and keys. In many instances, powder metallurgy is the only logical method, particularly where alloys difficult to machine are specified; or where intricate formations are desired.

One interesting comment from an expert in this field touches on the possibility that the voids might be filled with a non-metallic material to produce sound-deadening. This would be a decided virtue in making parts such as timing gears for gasoline or Diesel engines where noise elimination is imperative.

Conservation of natural resources is another consideration. Machining chips produce scrap as high as 50 per cent in normal operations whereas there is no waste in powder metal processing. Furthermore, it is claimed that metal processing sometimes saves as much as 25 per cent of part weight by reducing density in areas where the part requires least strength.

In the general applications of the technique are

Table 1—List of General Applications

Abrasion parts
Armatures
Ball-bearing cages
Bearings
Bits
Blanking dies
Blocks
Brackets
Brake linings
Bushings
Cams
Carbide tools
Catalysts
Chuck jaws
Circular saw teeth
Clutch friction facings
Collets
Contact points
Contacts
Cylinder liners
Detents
Distributors
Drawing dies
Electrical parts
Electrodes
Field magnets
Filaments
Filters
Friction facings
Gages
Gaskets
Gears
Generator brushes
Grinder centers
Grinding wheels
Guides
Heading tools
Housings
Instrument clutches, knobs, bearings
Jig bushings
Laminated parts
Lathe centers
Levers
Lock bodies, cylinders, pins, cams
Magnetic cores
Magneto weights
Molybdenum wire
Motor brushes
Nozzles
Oilless bearings
Pawls
Permanent magnets
Piston bearings
Porous bearings
Radio tuning cores
Ratchets
Refractory metals
Rollers
Rotors
Sand-blast nozzles
Sleeve bearings
Sliding blocks
Spacers
Splines
Swaging dies
Tungsten wire
Turbine blades
Valve Guides
Welding electrodes
Wire

those parts in which powder metal replaces sand and die castings, forgings, stampings, and machined elements. Often a powder metal part can be made to replace an assembly of two or more parts.

A unique advantage of the method lies in the fact that one can use powders of the metals or alloys as well as mixtures of metals and alloys and abrasives. Starting with the basic powder, the technique is alone in the metallurgical field from the standpoint that no melting is required. Thus intimate physical mixtures can be made of metals and materials in proper proportions, regardless of their melting points or chemical properties. Examples of such special mixtures are given below:

Copper combined with steel to make a self-brazing alloy.

Lead dispersed in copper for bearing surfaces; the former to give anti-friction properties, the latter for strength.

Oil combined interstitially with metal to give continuous self-lubrication.

Copper combined with carbon, as in commutator brushes; the former for conductivity and the latter for anti-friction properties.

Silver (or copper) combined with tungsten to make contact points; the former for high conductivity, the latter for resistance to heat and wear.

The joining of pigtails to commutator brushes.

Mixtures of copper, tin, iron, lead, graphite, and silica to make heavy duty friction surfaces.

Another exceptional property is porosity, particularly since this can be accurately controlled. While porosity implies some sacrifices in tensile strength, in some cases this can be increased by heat treatment. On the other hand, porosity reduces density and results in lighter weight. But the major role of porosity lies in its ability to impart self-lubricating properties. Although this is best exemplified in the oilless bearing it is a favorable factor in many applications where mating parts are protected from scuffing or seizure by self-lubrication.

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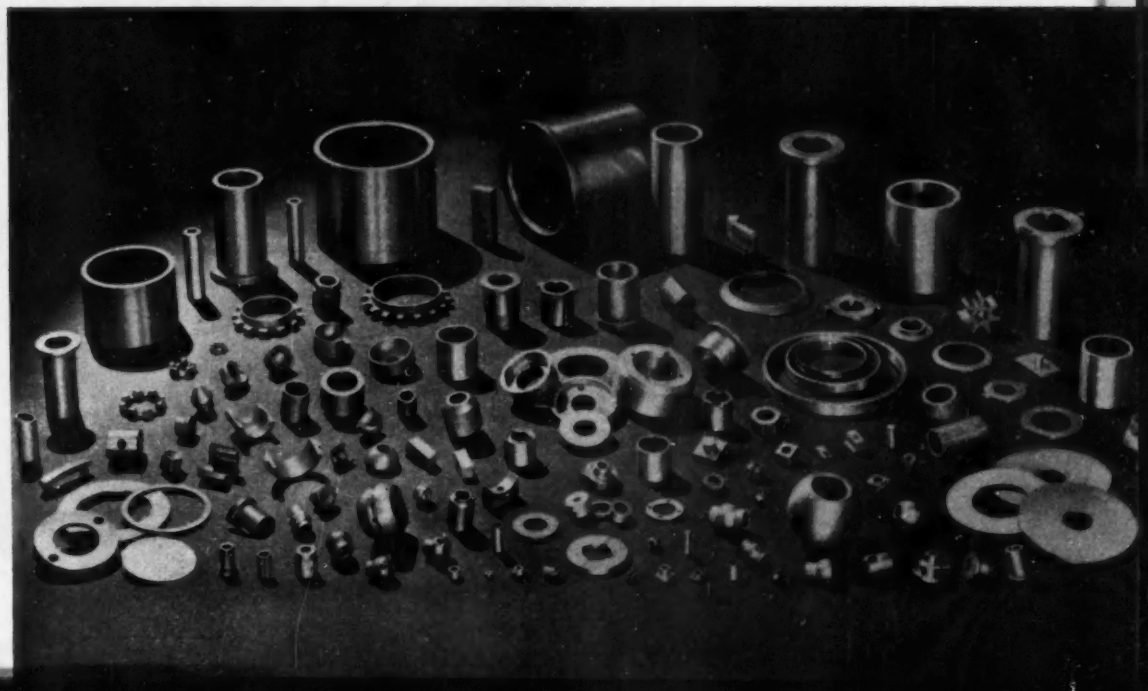
By Joseph Geschelin

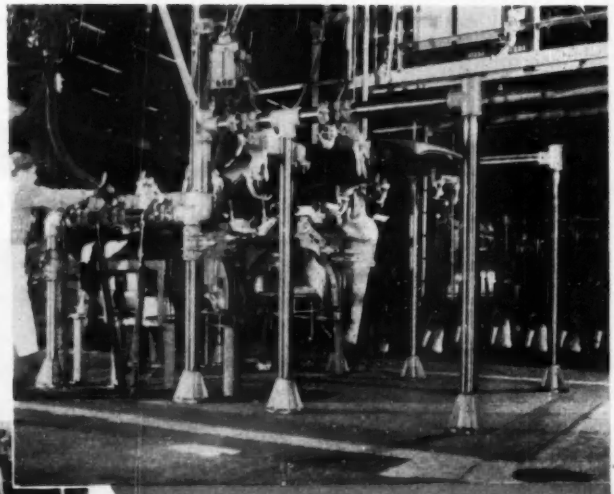
Powdered Metals

Here is overwhelming testimony that powder metal parts have many applications.



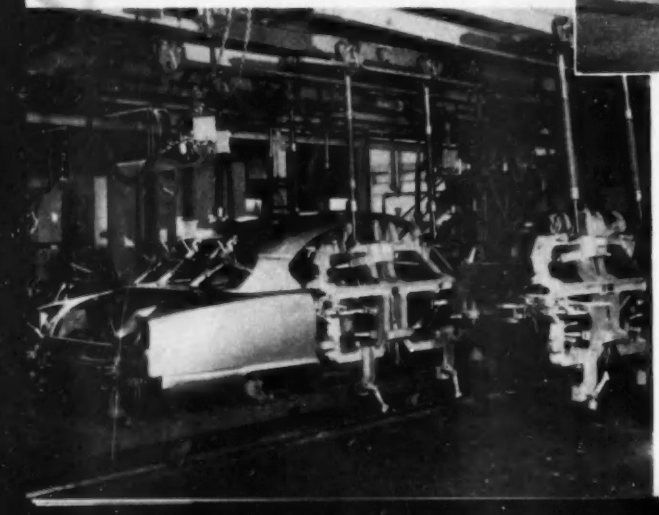
Joining of the front and rear sections of the underbody into an integral unit is done in this new Martin multi-spot welder. Interesting feature of the layout is the system of automatic transfer conveyors, shown in the foreground. Completed units, including the circular tire well, come out of the welder on the conveyor and are moved onto the line at right angles automatically.

K-F Improves



(Right) This is a view of the new welding fixture for Kaiser balloon assemblies. It consists of the massive open framework carrying hinged arms for clamping at various points.

(Below) A system of lightweight but massive gates for door openings in the new Kaiser bodies has been installed on the body-in-white line. The gates are suspended to reduce manual effort.



Facilities *for 1951 Model Run*

THAT things are rolling at Willow Run is borne out by the illustrations shown here. The breathing spell during the recent shut down for 1951 models was employed by Kaiser-Frazer in a new tooling program, additional mechanization in the form of conveyor lines and mechanical handling aids, in the development of automatic devices for unloading conveyors as in the case of the body truck return illustrated here, and in the form of welding fixtures of advanced and simplified design.

The press shop which started modestly with the birth of K-F, augmented a number of times in recent years, has been treated to still more units during the changeover and is now crammed to capacity.

Multi-spot welders, employed generously at K-F, have been brought up to date and feature some interesting items of new equipment in the form of Martin units for the Kaiser underbody. One of these joins the big circular tire well to the rear underbody section; another fastens the front and rear underbody sections together. An interesting feature of the latter machine is found in the automatic transfer conveyor for moving completed underbodies from the welding press to the feeder conveyor.

The balloon welding fixture for Kaiser bodies shows the results of progressive development and simplification. The Kaiser balloon assembly has more slender sections and is more flexible than before. The new

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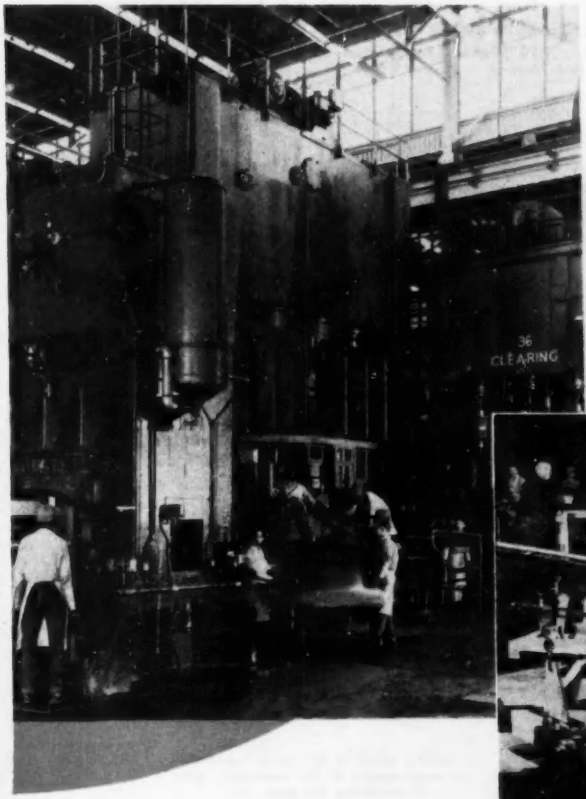
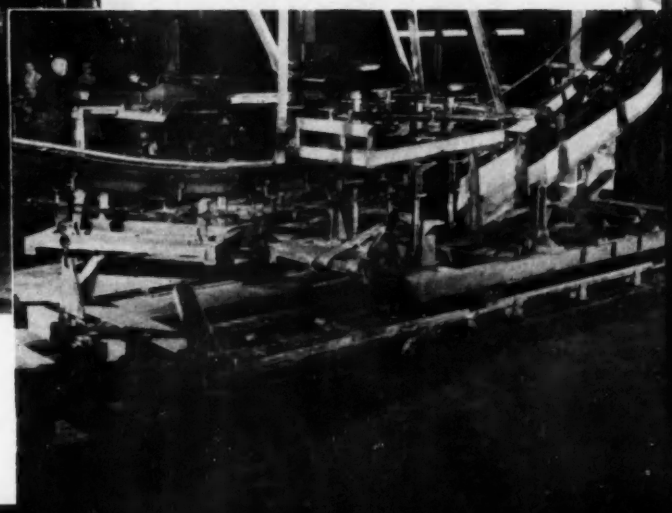


(Left) Current expansion of the press shop features a compact group of five big Clearing presses, the last three operations being pictured here. As the roof panel comes out of the press in the center it is slid onto the table in the center and fed into the press at the right. From this press the panel is slid onto the lower level of the table for movement to the last operation at the left.

(Below) Among the latest wrinkles in mechanizing materials handling operations is this arrangement for automatically unhooking body trucks from the return conveyor. As the body truck approaches the upgrade section of the return conveyor, the conveyor hooks are automatically disengaged, thus permitting the truck to ride the lower rail.



New Lancia Aurelia

Has V-Six Engine

By W. F. Bradley

Special European Correspondent of AUTOMOTIVE INDUSTRIES

Lancia's Aurelia model sedan, the first completely new car to be brought out by this Italian manufacturer since the war

FIRST entirely new post-war design to be produced by the Lancia Co., of Turin, Italy, is the Aurelia, a 114-in. wheelbase car weighing 2370 lb with sedan body, featuring a V-type six cylinder engine, independent suspension front and rear, with the engine in front and clutch, transmission and final drive forming a rear end unit.

One of the first in Europe to adopt independent front suspension, using unit body and frame since 1923, and specializing in V-type fours and eights for 14 years, Lancia has continued these same general principles while producing a car which is new and advanced from radiator cap to tail light.

The four cylinder type has been dropped in favor of the six in order to assure greater flexibility, but the advantage of reduced overall length has been retained by casting the cylinders in a 60 deg V. Bore and stroke are respectively 2.75 and 2.99 in., giving a piston displacement of 106.9 cu in. Valves are inclined in the light alloy heads and are operated from a single camshaft by means of pushrods and rockers. The fully-machined crankshaft is carried in four plain bearings and the two banks of cylinders are staggered to provide for mounting of the connecting

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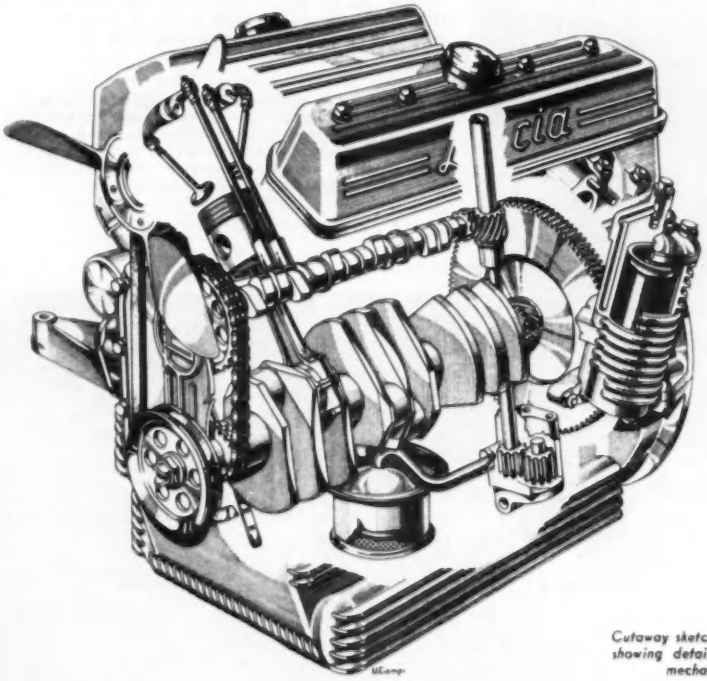
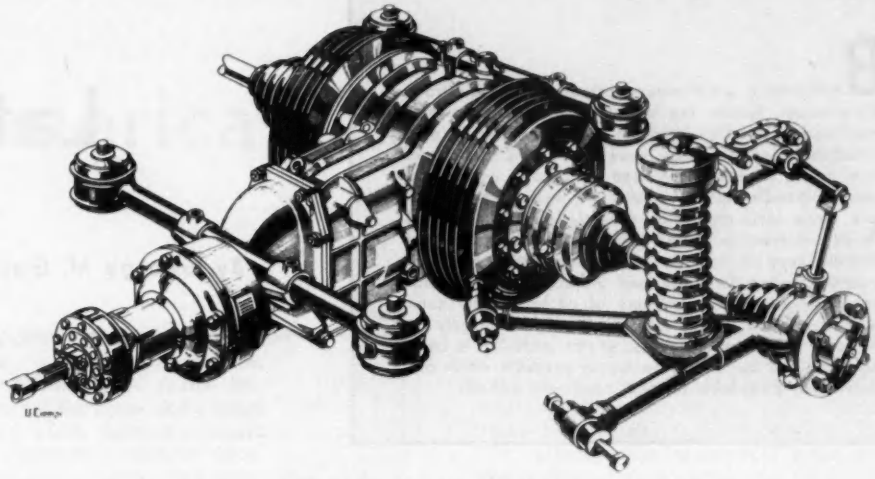
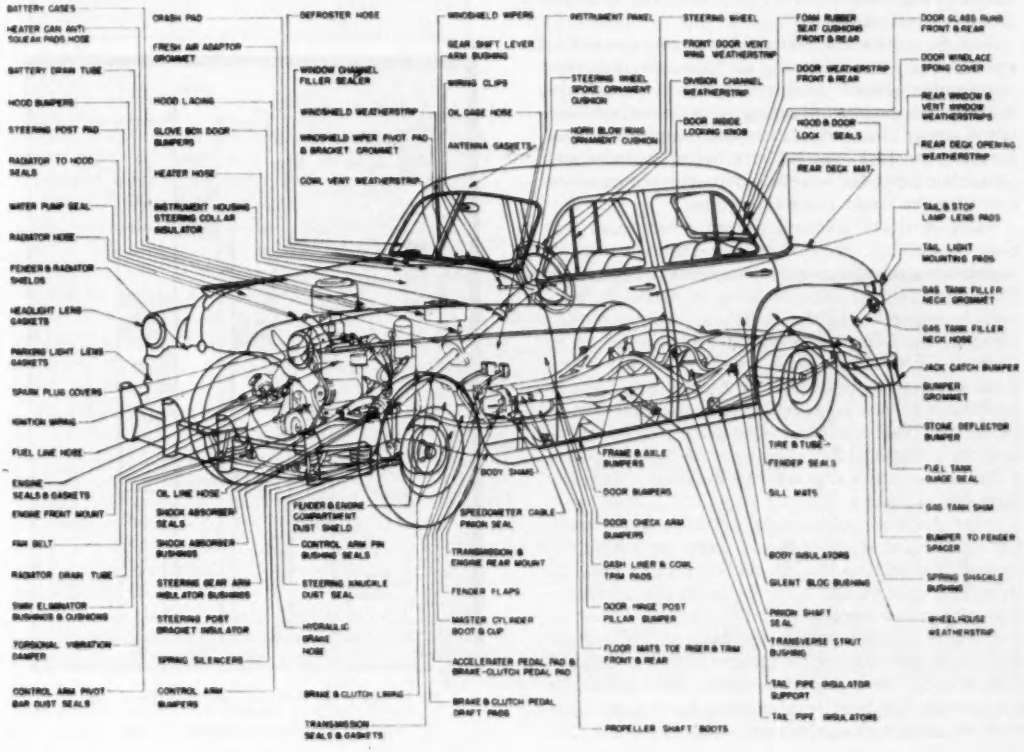


Cutaway sketch of the Lancia V-six engine showing details of the crankshaft, valve mechanism, oil pump, etc.



Clutch, transmission, and differential assembly are combined in a single unit as shown here

Rubber—As it is used in Modern U. S. Automobile



BARRING a world-wide depression or similar trade disturbances, tractor use in Latin America should show continued, substantial increases during the next decade. Industrialization is rapidly drawing workers away from rural areas, increasing the need for greater agricultural yield. Expanding urban populations, meanwhile, necessitate large scale sanitation projects, roadbuilding and similar construction. These trends, aided by moral and financial support from our own government, mean continuing demand for farm and industrial tractors, stationary engines and machinery of all kinds. Our competitive position in this market will depend largely on the scale of our own purchases of raw materials in Latin America, and our ability to supply products which are particularly adaptable to local conditions.—GMG

Latin

By George M. Galster

LATIN America is rapidly developing as an important tractor market. Thanks to growing industrialization, higher levels of prosperity and widespread agricultural support programs, tractor use there today is from four to six times greater than during the prewar era. Our sales of tractors and replacement parts have greatly expanded since the war, despite ever-present dollar shortages and increased European competition.

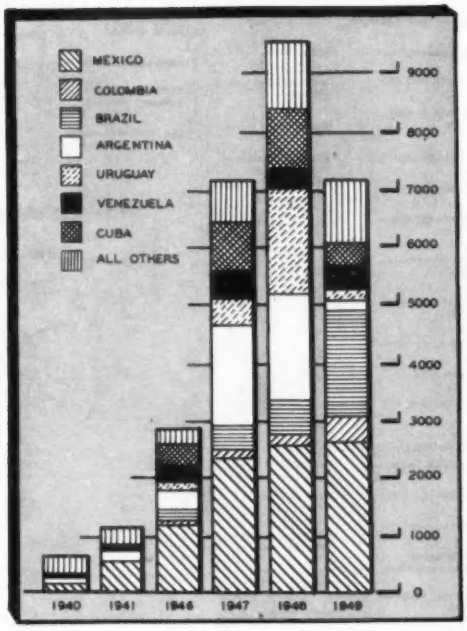
Several factors have contributed to this demand for tractors and prime movers of all types. Roadbuilding, temporarily slowed during the war, is now being pushed with renewed vigor in every important country to supply the needs of expanding industries. Such construction work, coupled with numerous large scale irrigation projects, is reflected in the increased demand for the larger tracklaying types.

Sales of wheel tractors, on the other hand, have been stimulated by various government programs aimed at expanding and diversifying agriculture. This trend toward self-sufficiency in foodstuffs is especially important in the Caribbean countries where economic specialization previously was carried to extremes. Cuba, for example, has reduced her dependence on foreign sugar sales by encouraging domestic production of rice, corn, coffee, potatoes, garden vegetables and similar staples. The same process can be seen in Venezuela, Colombia and the Dominican Republic where state support has drastically expanded farm mechanization.

Other countries, meanwhile, are actively encouraging production of such export items as cotton, insecticide materials, palm oil, rubber, coffee and fibers. Here, too, tractors and other farm machinery receive top priority on import quotas. Another factor increasing tractor use is the new land now under cultivation, either through irrigation or the division of large estates. In Mexico, Guatemala, Peru and Chile, this process has been supplemented by the establishment of numerous agricultural cooperative colonies, most of them equipped with government purchased tractors. In addition, almost every Latin American country has recognized the need for farm tractors by setting up farm credit bureaus, lowering import duties and fuel taxes, and by training farmers in the care of maintenance of tractors.

Competition

While the U. S. continues to dominate the tractor market in Latin America, our competitive position has weakened in countries like Argentina and Uruguay because of their natural trade balance with Great



U. S. Exports of One and Two Plow-Wheel Type Tractors
Source: U. S. Department of Commerce

America's *Importance as a* Tractor Market

British Exports of Wheel and Track Laying Tractors to Latin America

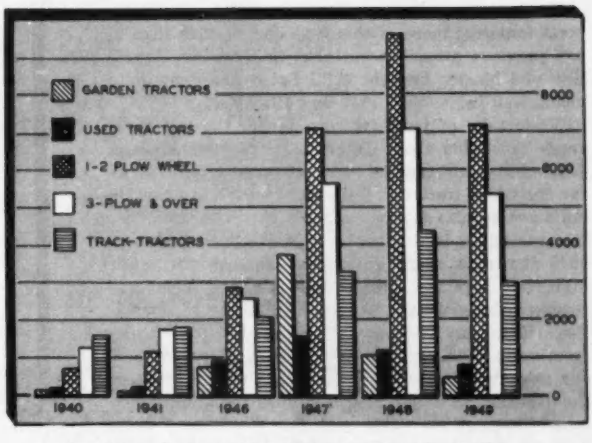
Source: The Society of Motor Manufacturers and Traders, Ltd., London, England

	1949	1948	1947	1946	1938
Argentina	307	2961	728	16	25
Brazil	432	194	210	79	18
Uruguay	631	1811	170	45	30
Colombia	94	22	12	—	4
Venezuela	35	132	97	4	3
Cuba	43	—	—	—	1
Mexico	101	497	94	10	6
Chile	139	16	16	6	1
Peru	86	37	2	20	—
All Others	15	19	39	—	—
Total:	1883	5389	1368	180	88

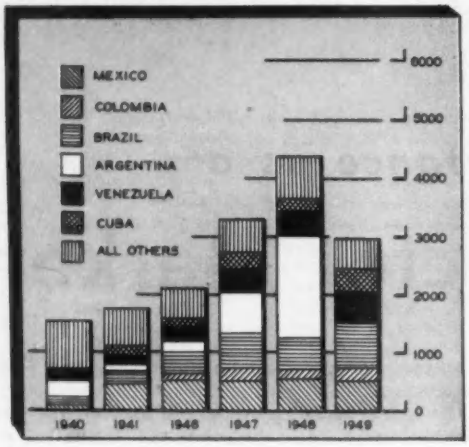
Britain and other manufacturing countries in Europe. In addition, devaluation of the British pound has created at least a temporary price handicap for importers of American products. U. S. sales also are hindered by general cash-on-the-line policies, while most European purchases can be made with small down payments and liberal credit terms. Some of these difficulties are offset, however, by better organized sales representation and by a wider selection of American tractor sizes.

On the technical side, U. S. tractors are preferred for their greater reliability and simpler maintenance, especially where repair facilities are limited. Wider distribution and standardization of replacement parts is another important advantage in this respect. Moreover, most of our newer tractors are simple to operate and can be adjusted easily to accommodate a variety of fuels. One item too often overlooked by American producers, however, is printing instruction manuals and parts lists in concise Spanish or Portuguese. A simple thing such as this can have a measurable effect on long range sales efforts.

Britain, of course, is our biggest competitor in the tractor market, with Ferguson and David Brown models being among the more popular. Canadian built tractors are coming into Mexico and other countries in growing numbers, but with the notable exception of Cockshutt, most of these units are produced by Canadian companies associated with U. S. firms. Several European producers, on the other hand, are seriously invading the field for tractor engines adaptable to irrigation, power generation and similar applications. Sweden, in particular, is offering a fairly complete line of Diesels for stationary installations, while Italy and Switzerland are shipping in quantities of small farm engines under five hp. Whether these countries will become important factors in the tractor market is yet to be seen. German equipment was widely sold before the war, and may become important again in the future. Competition from domestic producers is negligible, although Argentina assembles a few small power units and tractors using mostly imported parts. A Mexican concern also is reportedly working on a small Diesel farm tractor,



U. S. Tractor Exports to All Latin American Countries—By Type
Source: U. S. Department of Commerce



U. S. Exports of Track Laying Tractors—All Types
Source: U. S. Department of Commerce

but the project is still in the developmental stage.

Smaller Farm Tractors Popular

Since the end of the war, wheel tractors of two-plow capacity or less have moved most readily in the Latin American market. In Brazil, particularly, sales of this type have consistentlly increased about 200 per cent each year since normal shipments were resumed in 1945. Mexico, however, is still our largest customer in this category, averaging 225 units per month. Total Latin American imports of the smaller tractors reached their peak of 9600 units in 1948, with last year's shipments dropping to slightly over 7100. Second quarter reports in 1950 are expected to show a slight upward trend, with dealers building up their showroom inventories.

Larger wheel tractors of three plow capacity and over find a more limited market in Latin America, with the bulk of sales being made to large estates and cooperative colonies. Brazil, Colombia and Venezuela imported more of this type during 1949 than in any previous year, but cutbacks in Uruguay, Argentina and Mexico brought total Latin American shipments well below both 1947 and 1948 levels.

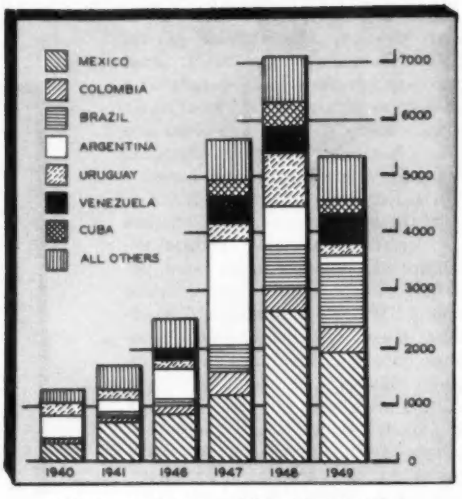
While sales of track-tractors during the last three years have been about double the 1939-1941 average, demand for this type has not expanded as greatly as for the wheel tractors. Both carburetor and injection units are popular in the Latin market, with the latter type taking the lead in post-war sales. Imports during 1949 showed a sharp drop from the previous year's high, but here too Brazil, Colombia and Venezuela reversed the general trend by buying record quantities. Even tiny Cuba imported over 400 tracklayers from us in 1949, accounting for about 15 per cent of our sales in Latin America. Probably two-thirds of the tracklaying types are used in roadbuilding and other construction work, and for this reason sales have not been increased so greatly by post-war farm mechanization.

Our exports of garden tractors and used farm tractors reached their peak early in 1947, but the demand for these units largely disappeared when other types became available. Venezuela, for example, purchased nearly 800 garden tractors and rotary tillers in 1947, but ordered less than a dozen two years later. In most of the South American countries today, it is virtually impossible to obtain an import license for garden tractors.

Brazilian Market Expanding

Brazil, largest of the Latin American countries, is undoubtedly our biggest potential tractor market. Its industrial structure is well advanced, its mineral and agricultural resources are extensive, and it is the only country in the world having large, unused areas of fertile soil. Moreover, its products sell readily for American dollars. The coffee industry alone, for instance, will bring in about $600 million in 1950, and these revenues will help to finance the Five Year Plan for developing highway, irrigation and power facilities. Brazil's greatest weakness is fuel. Only negligible amounts of petroleum are produced, and the government is strongly encouraging the use of producer gas and industrial alcohol as motor-fuel substitutes for gasoline.

In spite of these high fuel costs and cheap Brazilian farm labor, farm mechanization has shown a sharp upward surge since the war. Yearly imports of all types of farm tractors from the U. S. and other sources now approach 4000 units, contrasted to an average of about 250 per year before 1941. Two-plow capacity gasoline tractors presently account for about 40 per cent of total sales, and the bulk of these are going to the heavily settled farming sections around



U. S. Exports of Three and Four Plow-Wheel Type Tractors
Source: U. S. Department of Commerce

Sao Paulo. Accessories and replacement parts for tractors also have been imported in growing quantities as shown by the following figures:

Year	Wheel Tractor Imports—Brazil
1941	$100,000
1946	58,000
1947	299,000
1948	394,000
1949	676,000

Competition from British manufacturers is also growing in Brazil. Before the war, yearly purchases of English tractors averaged 25 units. During 1947 and 1948, however, annual sales were slightly over 200, while last year's shipments jumped to 432.

Mexico

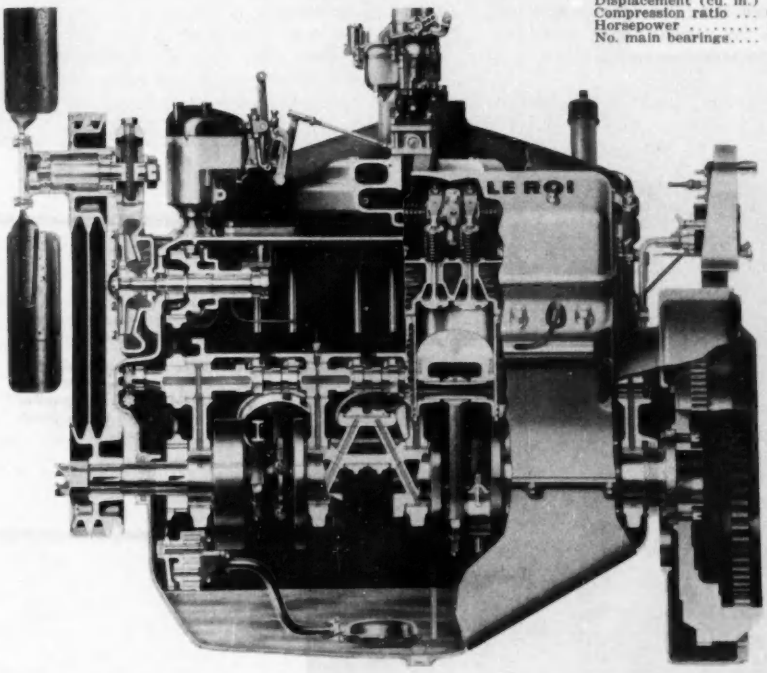
For many years, Mexico has been our biggest Latin American importer of tractors and roadbuilding machinery. Today, while dropping in relative importance, Mexican sales still account for about 18 per cent of our track-tractor and 33 per cent of our wheel tractor shipments. A large proportion of the latter are carburetor types under 35 drawbar hp. About half of the used tractors sold in Latin America also go directly across the Rio Grande, as do 25 per cent of our garden tractors. (*Turn to page* 134, *please*)

Improved LeRoi Engine

RECENT improvements in the Model H540 truck engine made by the LeRoi Co. have resulted in higher peak hp, greater torque, and a wider speed range. This overhead valve, V-eight engine now has a compression ratio of 6.5 to one, and develops 207 hp at 3000 rpm using 73-75 octane gasoline. Maximum torque is 450 lb-ft. Recommended operating speeds for truck service are 400 to 3300 rpm. As shown in the cutaway illustration, connecting rods are arranged side by side on the five-bearing crankshaft. Alloy iron liners are the wet type. The H540 can be equipped with either magneto or distributor ignition. Drive for the water pump, mechanical governor, and ignition unit is through an accessory gear train located above, and driven by, the camshaft gear. For butane operation, high compression heads, and a special gas carburetor and vaporizer are available.

Specifications

No. of cyl	Eight
Bore (in.)	4⅛
Stroke (in.)	4¼
Displacement (cu. in.)	540
Compression ratio	6.5 to 1
Horsepower	207 @ 3000 rpm
No. main bearings	5



Cutaway view of the H540 engine showing details of the valves, connecting rods, crankshaft, water pump, etc.

Packard's Ultramatic

Part Three

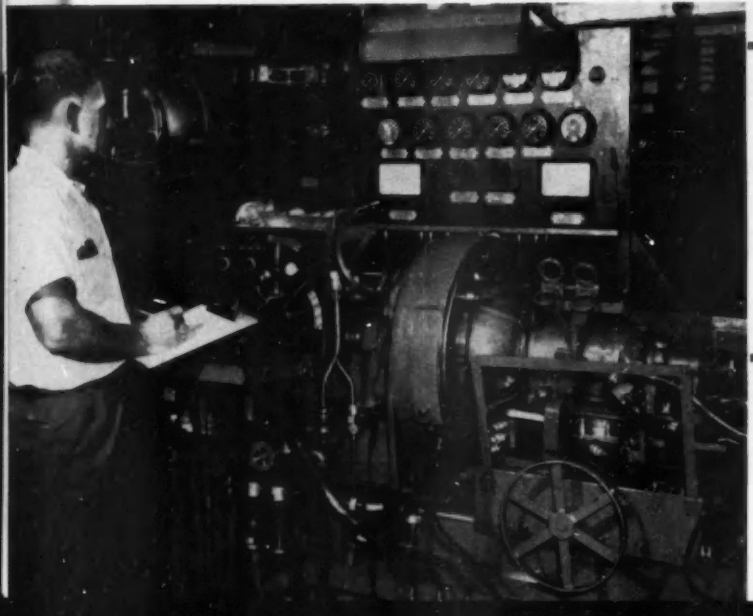
This Article Traces Assembly of the Unit through a Modern, Flexible Layout Planned for Smooth Flow and Minimum Materials Handling

By Joseph Geschelin

SKILLFUL planning and layout have organized the assembly of the Packard Ultramatic transmission in a smooth flowing pattern with the minimum of materials handling, housed within a relatively modest floor space area. Examination of the floor plan reproduced here will enable the reader to visualize the simplicity of the layout as well as the rhythm of the operation from start to finish. Naturally the center of interest is the merry-go-round assembly conveyor which is timed by means of a power-driven vari-speed drive. The line is composed of 34 individual assembly stands, each one provided with a universally adjustable fixture for holding the transmission and permitting the work to be turned in convenient positions for various operations. The platform has sufficient room for an operator to ride it in comfort.

Enveloping the conveyor, starting at the extreme left with the first station and continuing to the right around the bend and part way on the opposite side, are sub-assembly bays in which the components of the transmission are assembled and tested. Then at the head of each sub-assembly division is found a platform containing bins loaded with small parts and fastenings required for the specific installation, as well as space for the bank of sub-assemblies produced at each point. It will be seen that these materials platforms hug the assembly closely so as to present the parts within convenient reach of the man on the assembly line.

Component parts of the transmission are delivered to the assembly floor on the main stock transfer conveyor which runs from right to left along the lower edge of the floor plan. They are carried through the large washer at the lower left hand corner of the diagram where they are washed, rinsed, air dried, and



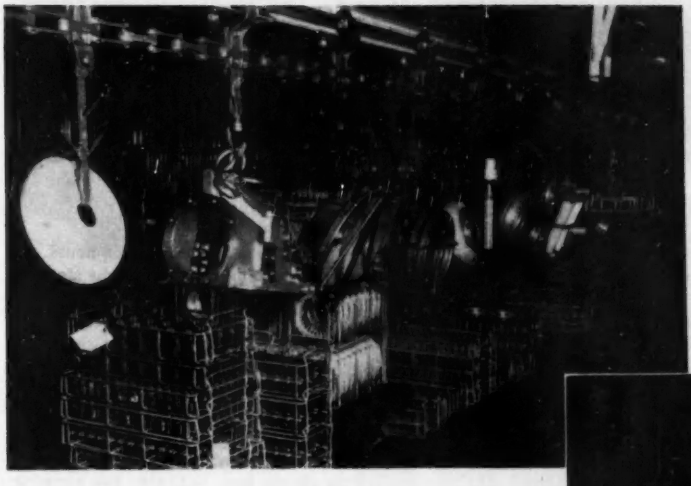
Here is the test machine designed for putting assembled Ultramatic transmissions through the specified phases of operation before acceptance.

Transmission *in Production*

dried with a hot air blow off at 210 F. The conveyor then bends at right angle and is extended to a bend at station one where the operator picks off the transmission case for placement on the assembly stand. The transfer conveyor continues its movement in a series of loops traversing each of the sub-assembly departments, completing its course on the opposite side of the assembly line.

Continuous threading of the feeder conveyor thus provides the assembly line and sub-assembly departments with a constant flow of clean parts.

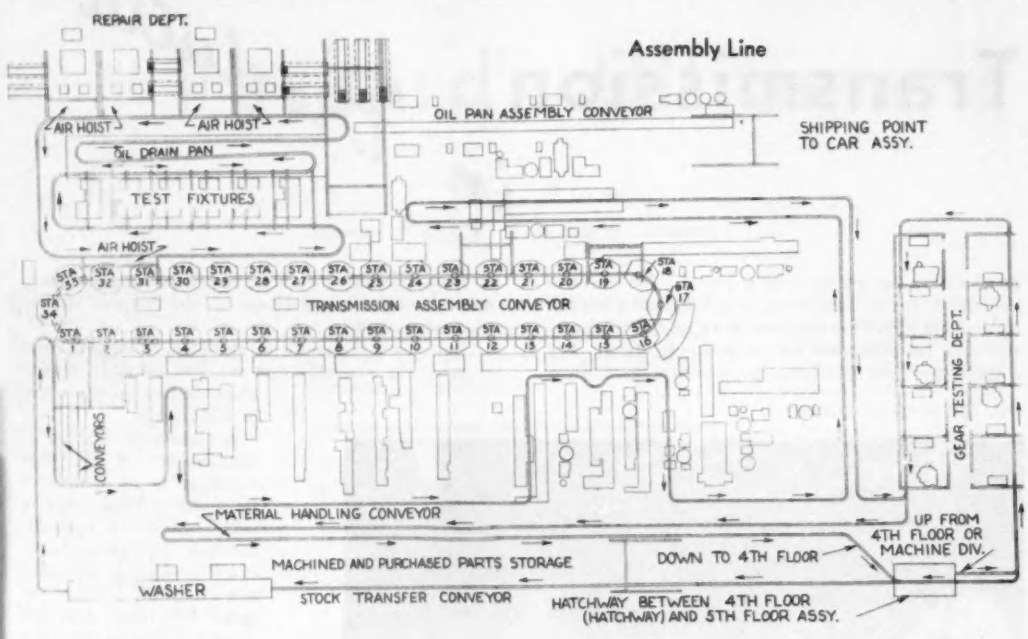
A significant feature of management of the final assembly is its departure from conventional practice with respect to operator function. As a general rule, line production demands minute sub-division of tasks with each operator usually handling only one or two simple operations at his station. Integration of a major assembly is thus performed in a series of



View of monorail feeder conveyor traversing the sub-assembly and assembly stations in the Ultramatic final assembly department. Note the variety of parts transported on this conveyor.

Closeup of one of the assembly stands on the final assembly conveyor. The operator rides on the stand, the assembly being built up conveniently on the universal type fixture shown here.

Packard's Ultramatic Production



stages along an assembly line with each worker on the line contributing his share of the operation.

In the case of the Ultramatic, however, careful study of component assembly stations showed variations in the time required for the installation of individual components. Consequently, it was decided in the interest of overall economy and expediency to have a single operator complete the entire assembly. The study indicates that assembly operations will be smoother and accomplished with the minimum of man-hours. In this arrangement the operator starts with the stand at station one and continues with it along the entire course of the conveyor until he reaches the end of the line on the opposite side.

By this time the transmission is in its finish-assembly state except for installation of the oilpan. At the end of the line, the assembly is lifted off the stand by means of a rail mounted overhead air hoist and delivered to the test stands. The floor plan as shown here indicates the complete installation of six test machines. At the present writing only the first test stand is in use, the others to come in as production volume is accelerated.

As Ultramatics complete the test schedule they are removed from the test stand and suspended on an overhead conveyor for a trip over a gigantic basin for oil drain. The conveyor loops back and forth over the basin to provide an interval of 34 minutes for

(*Turn to page* 112, *please*)

This is a closeup of one of the sub-assembly benches showing the assembly of the governor mechanism with the operator in the act of testing a finished unit. A feeder conveyor may be seen in the background.

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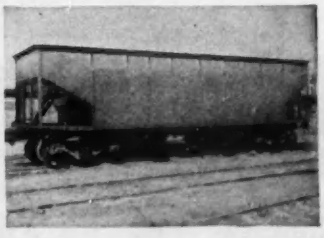

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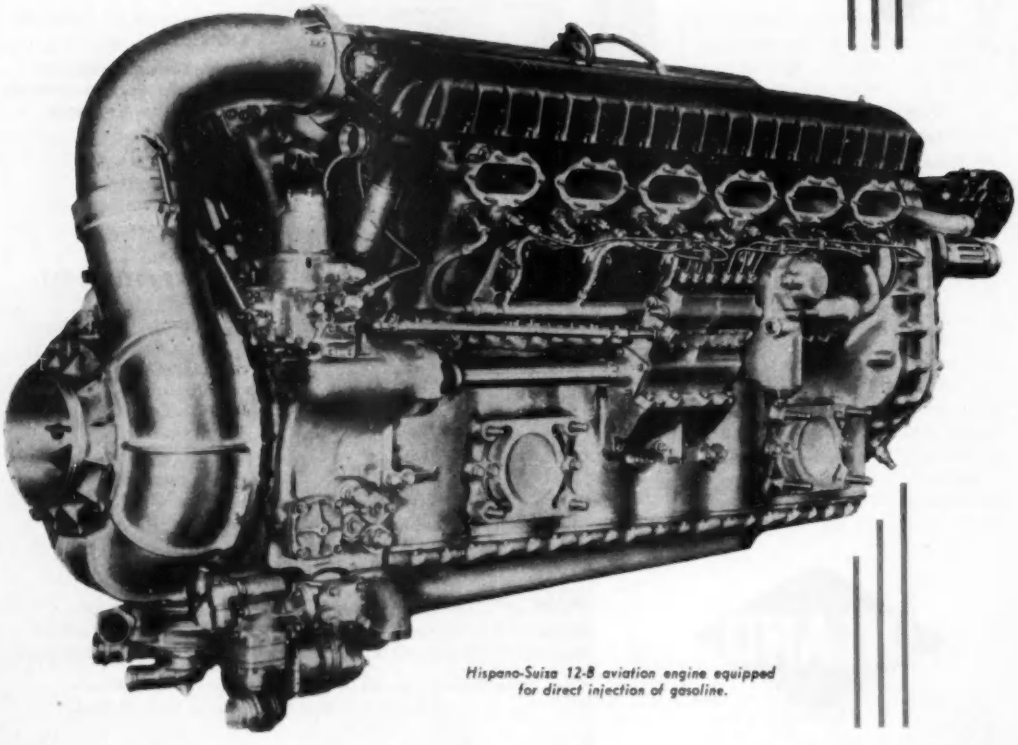
Latest Hispano-Suiza

Aviation Engine

THE French manufacturer Hispano-Suiza is in production on the 12-B aviation engine which features a single stage one or two-speed centrifugal supercharger and direct injection of gasoline. The cylinders, in two banks of six, have a bore of 5.9 in. Piston stroke is 6.69 in. and displacement 2196 cu in. The engine is a development of the 12-Z and embodies its main structural features, particularly its valve gear with overhead camshafts and two intake and two exhaust valves per cylinder. The propeller is driven by a spur-type reduction gear with a ratio of either 0.5 or 0.3. Total weight of the engine is 2000 lb with one-speed supercharger and 2046 lb with the two-speed supercharger. Hispano-Suiza is also in production on the Nene jet, under Rolls-Royce license.



Hispano-Suiza 12-B aviation engine equipped for direct injection of gasoline.

in the final accounting

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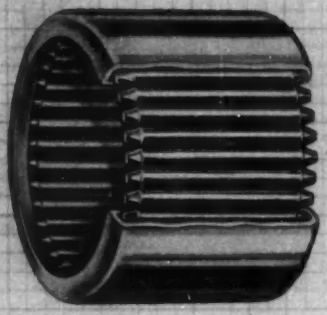

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AIRBRIEFS

By ROBERT McLARREN

Air Force Favorites

A run-down of Air Force procurement for the 1950 fiscal year, now nearly complete, shows that the USAF is sticking to its tried-and-trusted old favorites in its purchases. The reason for this is two-fold: first, it's cheaper —far cheaper—to buy those airplanes already rolling down the production line; and, secondly, no one has yet proved how far the intensive development of a single airplane design can go. For example, such mysterious new numbers as the F-94 and the F-97, for which the USAF is spending a combined total of $120 million in the 1950 fiscal year, is just our old friend the P-80 Shooting Star all dressed up and with plenty of places to go. When the original XP-80 appeared in 1944 it weighed only 4½ tons and had a mere 500 mph top speed, pretty exciting back in those days before the invasion but mighty tame by today's standards. Anyone could have told you that this was a good beginning, a suitable trial horse while the U. S. tried out its jet wings, but an airplane with no future. When the F-97 joins tactical units next year it will be just seven years away from its prototype, yet an Air Force first-line fighter!

The F-97 comes by its form honestly; Lockheed added a second seat to its F-80C fighter and came up with the TF-80C of T-33A jet trainer. Adding radar to the nose made it the F-94 all-weather fighter and the substitution of a thinner wing profile and the more powerful Pratt & Whitney J48 turbojet engine made it the F-97. The new North American F-95 is just the famed F-86 Sabre in a new all-weather guise and the YF-96A is simply the familiar Republic F-84 Thunderjet with swept wings added. And so it goes.

Something for Nothing?

But "development," as progressive though it sounds, is a two-headed coin. Development usually means the rapid addition of weight to an airplane in the form of more equipment and, everything else being equal, its performance suffers accordingly. To solve this problem additional power is usually specified, which brings the performance back to or even beyond the original. However with the wing unchanged—as is usually the case—wing loading goes up accordingly and what was once known as a "sweet bird" quickly becomes a "fire bird" (we're not kidding —these are actual terms used by Air Force pilots) and trouble starts brewing. The immortal North American P-51 Mustang is a case in point. It started life as a trim interceptor weighing only 7724 lb fully loaded. It was plunged immediately into the frenzied development of World War II and the Air Force and North American suddenly found themselves with a six-ton monster on their hands by the time they had reached the "D" model. Horsepower had jumped from 960 to 1490 to accommodate the weight growth but the vicious circle was closing in. There were two solutions open, and North American took both of them. First, NAA engineers tore up the drawings and started all over again, mercilessly tossing everything out of the airplane that could be spared. The result was the "light weight" XP-51G weighing only 8879 lb and having a top speed of 472 mph. The other was the XP-82, a twin-engine version with two Mustang fuselages serving as nacelles. This arrangement gave 4400 hp but drove the weight up to more than 12 tons. Development is obviously a double-edged sword and with the present Shooting Star development weighing just twice its prototype weight, it's clear that slide rule stretching is a very precarious occupation.

Refusing the Jump

Like a balky jumper, the U. S. airline industry is refusing the leap into the turbojet-powered airliner business. Many engineers had predicted carefully that the United States, in one fell swoop, was sure to by-pass the laborious development period of the turboprop power plant and catapault itself dramatically into the pure jet field, thereby neatly overtaking our British cousins. It is now clear that such is not to be the case. Considerations of lack of funds, cautious concern over anticipated operational problems, and careful regard for the multitude of engineering studies are among the reasons given but, whatever the reason, it is now apparent that U. S. airlines are entering the turboprop era through which they must progress before coming to the turbojet airliner. In a matter of a few months, the technical picture has been completely reversed and, at least in our experinece, there has been no comparable revolution in such a brief period (not even excepting the monoplane, all-metal design or the retractable landing gear). Convair, Martin, Lockheed, Douglas and Boeing—the Big Five of airline transports—are furiously at work on turboprop versions of existing designs and United Air Lines vice-president J. H. Herlihy recently made the startling announcement that UAL could not risk buying additional reciprocating engine aircraft in the face of turboprop competition by other airlines. Startling not because it is anything less than a fact, but because it epitomizes the revolution that has overturned airline thinking in less than six months time! Eddie Rickenbacker states flatly that his new Lockheed L-1049 transports will have turboprop engines by late 1954 or certainly by 1955. Martin advertises its new 4-0-4 as the first airliner expressly designed for turboprop power and American Airlines is rumored to be converting one of its DC-6's to turboprop power under Navy contract. United Air Lines is negotiating with Douglas for a factory-modified turboprop-powered DC-6.

Why No Jets?

Although Lockheed is known to have the design of a pure jet transport well in hand and Boeing is ready to start detail design, it seems clear that the pure jet airliner has been rudely shoved back five years in the scramble for the turboprop conversion of existing aircraft. Why? Most obvious answer is, of course, the economics of the problem; the first cost and the comparatively high cost of operation assuming present requirements for fuel allowances. But there are other factors in the picture. For one thing the pure jet airliner is largely predicated on the use of the "ultimate" system of air navigational aids and this system is being delayed slowly each year by a combination of tight Congressional purse strings and violent technical eruptions. Many airlines and manufacturers seem to agree that since the ultimate system can't be counted on until some time in the 'sixties that there's plenty of time yet before planning seriously on the pure jet transport. Perhaps a more important factor, however, is the truly astonishing job that Allison engineers did on their T38 and T40 turboprop engines. Allison did more than turn out a successful turboprop engine in these units—it produced an excellent

(*Turn to page 62, please*)

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Publications AVAILABLE

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H-119 Materials Handling Equipment

Barrett-Cravens Co. — Engineering sketches present in detail the advanced features of the new Barrett MD Hydraulic Lift Truck in Bulletin No. 5031. Tables containing specifications and dimensions of the trucks are included in the bulletin.

H-120 Power-Grip Chucks

Sundstrand Magnetic Products Co.—A new color folder is available which describes the company's magnetic chucks for milling, grinding, planing, turning and buffing operations. Descriptions of the machine, general purpose fixtures and specifications are included in the well illustrated folder.

H-121 Molybdenum Technical Data Sheet

Fansteel Metallurgical Corp.—Methods and procedures for forming and fabricating molybdenum are detailed in a Technical Data Bulletin, No. 4.303. Instructions are given for forming, punching, shearing, drawing, etc.

H-122 Lapping

Crane Packing Co.—A booklet illustrating and describing the new Lapmaster method of flat lapping is available. Photographs, diagramatic drawings and complete data on the Models 12 and 24 is given. Information is given, also, on operation and production results. A section of the book is devoted to Lapmaster accessories.

H-123 Metal Cleaning

Cincinnati Cleaning and Finishing Machinery Co.—A new, illustrated catalog of metal cleaning and finishing machinery includes a brief discussion of metal cleaning principles, photographs and descriptions of many varying machine types. Operational features are shown and described.

H-124 Drill and Tap Chucks

Scully-Jones and Co.—A new 8-page bulletin, No. 1-50, describes and illustrates the style B drill chucks. A revised net price list is included.

H-125 Compressed Air and Gas Power

Compressed Air and Gas Institute—A new, 18-page booklet contains extensive basic reference data on compressed air and gas power. It is divided into three sections: Uses of Compressed Air; Theory of Compressed Air and Types of Compressors.

H-126 Stainless Steels

Armco Steel Corp.—A new illustrated 12-page booklet, "Stainless Steel for Heat Resistance," presents a concise discussion of the properties of stainless steel and outlines proper grades for parts subjected to heat. Graphs show the relative scaling resistance, high temperature tensile

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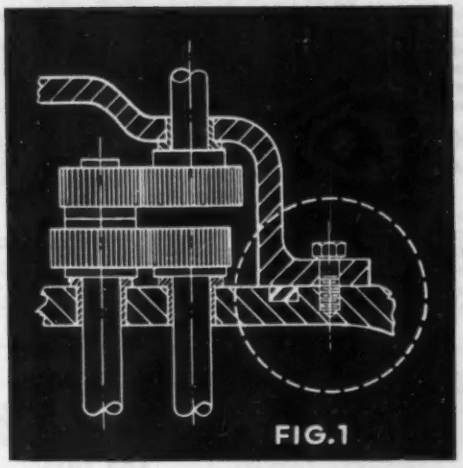
FIG.1

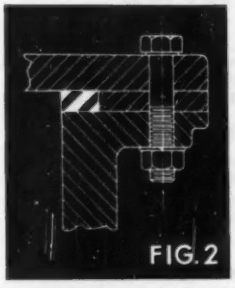
FIG.2

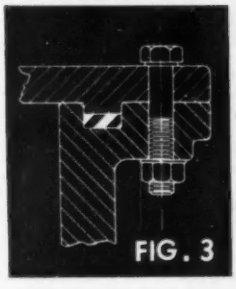
FIG. 3

Effective sealing of metal-to-metal joints requires: (1) complete filling of the recessed gasket channel to provide maximum contact area between gasket and mating flange and (2) correct gasket compression to prevent seepage of the sealed medium or crushing of the gasket.

Both of these requirements can be met with gaskets cut from truly compressible materials like Armstrong's Cork-and-Rubber Compositions.

To fill the channel completely, cork-and-rubber gaskets are cut to full channel width and, depending on compressibility, from 1.25 to 1.5 times channel depth. Because these gaskets actually decrease in volume under load, they do not require relief for sideflow or excessively close gasket and metal tolerances.

Correct gasket compression is also assured with the right cork-and-rubber composition. Each cork-and-rubber material combines controlled amounts of truly compressible cork and non-compressible synthetic rubber. Hence it provides a predetermined degree of compressibility to handle the desired range of flange pressures.

Typical of the metal-to-metal sealing jobs done by cork-and-rubber is the instrument flange in figure 1. Completely confined, the cork-and-rubber prevents seepage of the lubricating oil and permits perfect alignment of the gears.

In figure 2, flat flanges were adapted to metal-to-metal sealing by inserting an annular shim. Here, cork-and-rubber compresses to form a tight seal without tending to flow out of position.

The high-pressure flange shown in figure 3 utilizes a stop to prevent blowouts. By completely filling the confined volume, cork-and-rubber insures a tight seal.

Effective sealing of metal-to-metal joints is but one type of job handled by Armstrong's Cork-and-Rubber Compositions. Your Armstrong representative will gladly help you apply these versatile materials to your application.

Send for this Gasket Handbook

You'll find useful application and specification data in the revised 24-page booklet, "Armstrong's Gasket and Sealing Materials." It contains up-to-date information on straight synthetic rubber, cork-and-synthetic-rubber, and cork composition gasket and sealing materials.

This booklet includes ten technical discussions of the factors influencing modern gasket and joint design. It also suggests methods of putting Armstrong's stock materials to specialized uses in such fields as radio, electrical, automotive, petroleum, and transportation industries.

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strength, etc. The booklet also points out what stainless steels offer for heat-resisting applications and outlines ten general suggestions for selecting the best type of stainless for a particular heat-resisting application.

H-127 Horizontal Milling Machines

Sheldon Machine Co., Inc.—Included in an attractive new color booklet describing the Sheldon Vernon Horizontal Milling Machine, are specifications, features accessories, etc. The company's precision lathes are also pictured and information on the features included.

H-128 Screw, Bolt and Washer Assemblies

Eaton Manufacturing Co.—Springtites and Sems Engineering Folder S-49 contains information on the new class 2A Thread fit for screw or bolts and information on slotted Phillips and Clutch Head on all types of heads, as well as a production story on Springtites and Sems.

H-128 Broaches

The Kase Machine Co.—Bulletin No. 13 contains operating and engineering data, specifications, and prices on the complete line of Glenny adjustable push broaches and accessory items. The bulletin contains cutaway illustrations of the Glenny broach, showing principles of construction and operation. Performance and Operating data are included. Roach Kets and Tool Room Sets are illustrated with details on sizes and capacities as well as prices.

H-129 Pressure Instruments

Fischer & Porter Company—Temperature instruments—Ratotherm and pressure instruments—Ratigage, are illustrated and described in Catalog 86. In addition to illustrating and describing the instruments, combinations of temperature, pressure, flow, etc., and cascade control are discussed. Also included is a description of the Type 3 Pneumatrol unit.

H-130 Pressure Tanks

American Wheelabrator and Equipment Corp.—A new 4-page bulletin describes tanks that operate continuously and intermittently. Pictures and detail drawings illustrate the test.

H-131 Fittings

The Aircraft Fitting Co.—Bulletin F-10 describes and illustrates the AFCO all purpose flareless fittings. Included in the bulletin are list of features, prices, etc.

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FOR THESE
SPECIALIZED PRODUCTS

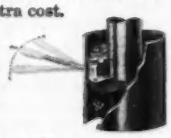
- Ignition switches
- Turn signal switches
- Rolled shapes

AUTOMOTIVE IGNITION SWITCHES

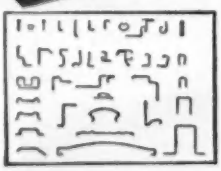
Installed as original equipment on many popular-make motor cars, trucks and buses, Mitchell ignition switches are known for their sturdy construction and extra long life. "Radio" position available without extra cost.

Mitchell ignition switches, turn signal switches and rolled shapes meet the most exacting specifications of the automotive industry for quality and excellence of design. You will find these Mitchell products widely used by leading manufacturers of cars, trucks, buses and tractors.

Mitchell clamp-on and screw type semi-automatic turn signal switch for trucks, cars, buses, tractors.



Mitchell 6-wire concentric type semi-automatic turn signal switch used in passenger cars.



TURN SIGNAL SWITCHES — Mitchell semi-automatic, self-cancelling turn signal switch affords motorists an easy, positive method of indicating right or left turns — gives pedestrians and approaching and following vehicles accurate, fully visible turning information.

ROLLED SHAPES—Mitchell offers a complete range of metals, designs and gauges in stainless steel, aluminum, brass, bronze, copper; cold rolled, drawn and pressed for automobiles, airplanes, architectural requirements, railroad cars, radios, television receivers, all industrial uses.

Our sales engineers work with you in the application of Mitchell products to your specific designs. Call on us at any time.

UNITED SPECIALTIES COMPANY
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IGNITION AND TURN SIGNAL SWITCHES • ROLLED SHAPES • DOVETAILS
UNITED AIR CLEANER DIVISION • CHICAGO 28
AIR CLEANERS • METAL STAMPINGS

Fruehauf Reports Increase in Sales and Earnings

Sales of truck trailers have picked up along with the current boom in truck sales. Fruehauf Trailer Co. reports net earnings for the first three months of this year at $1,371,061, compared with $808,018 for the same period a year ago. Sales totaled $21,715,582, compared with $19,119,612 for the same period in 1949.

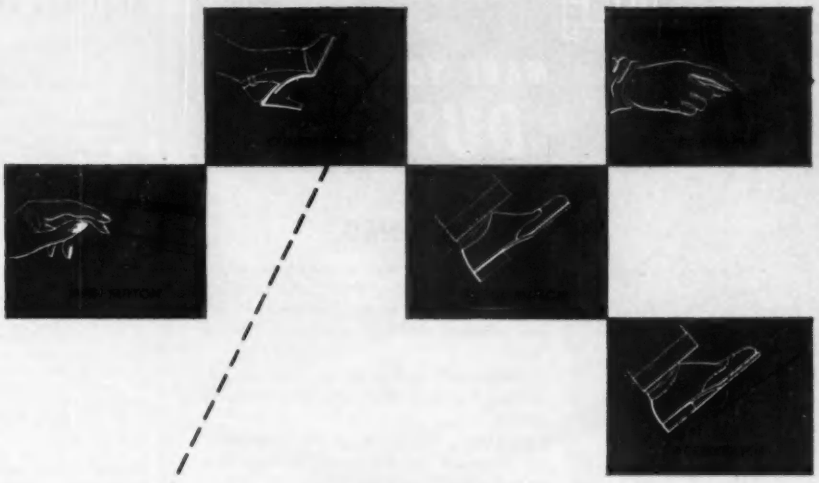
McAleer Changes Name to Higbie Mfg. Co.

A change of name from McAleer Manufacturing Co. to the Higbie Manufacturing Co. has been voted by stockholders. Operation of the company will not be affected in any way by the change in name, nor will personnel be changed. The company will consist of four separate operating divisions: Avon Tube Co.; General Crafts Div.; and McAleer Mfg. Div., all of Rochester, Mich.; and Bronson Reel Co. of Bronson, Mich.

Oldsmobile Extends One-Piece Windshield to "88"

Oldsmobile has adopted the one-piece windshield for its 88 model because of popular demand. The switch has already been made at the Lansing plant and is currently being put into effect at the B-O-P assembly plants. The 88 model, incidentally, is by far the most popular in the Oldsmobile line, accounting for more than 62 per cent of total production.

SPECIALISTS IN ALL TYPES OF STARTING



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The extra safety of clutch pedal starting combined with the time-tested reliability of the Bendix* Starter Drive makes a sales combination that is hard to beat. Best of all, you can add clutch pedal starting at a lower cost with the Bendix Starter Drive than any other way. With a record of over 80,000,000 installations, it's the best proved drive in the industry. In addition, its compactness lets you mount starting motors almost anywhere, giving greater flexibility of design. No matter which kind of engine starting you employ, specify Starter Drives by Bendix—specialists in *all* types of starting.

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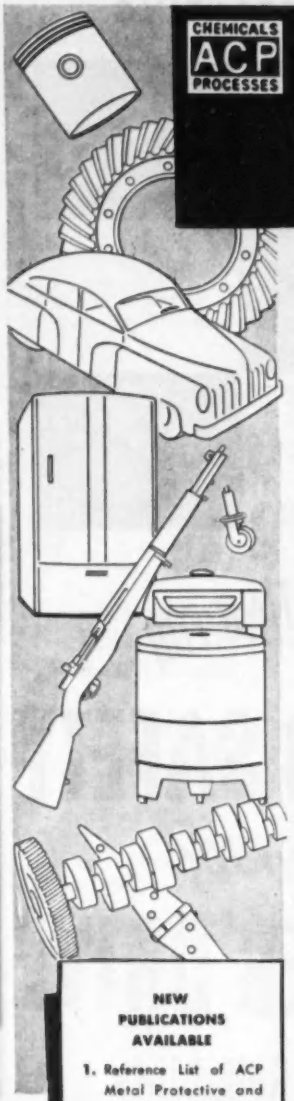

CHEMICALS ACP PROCESSES

PHOSPHATE FINISHES TO MAKE YOUR PRODUCT DURABLE

PAINT BONDING

"Granodine" forms a zinc-iron phosphate-coating bond on sheet metal products — automobile bodies and fenders, refrigerator cabinets, etc. — for a durable, lustrous finish.

"Lithoform" makes paint stick to galvanized iron and other zinc and cadmium surfaces.

"Alodine", the new ACP protective coating chemical for aluminum, anchors the paint finish and protects the metal.

RUST PROOFING

"Permadine", a zinc phosphate coating chemical, forms on steel an oil-adsorptive coating which bonds rust-inhibiting oils such as "Granoleum."

"Thermoil-Granodine", a manganese-iron phosphate coating chemical, forms on steel a dense crystalline coating which, when oiled or painted, inhibits corrosion.

PROTECTION FOR FRICTION SURFACES

The oiled ***"Thermoil-Granodine"*** coating on pistons, piston rings, cranks, camshafts and other rubbing parts, allows safe break-in operation, eliminates metal-to-metal contact, maintains lubrication and reduces the danger of scuffing, scoring, galling, welding and tearing.

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"Granodraw" forms on pickled surfaces a tightly-bound adherent, zinc-iron phosphate coating which facilitates the cold mechanical deformation of steel, improves drawing, and lengthens die life.

Write or call for more information on these products, and advice on your own metal-working problem.

NEW PUBLICATIONS AVAILABLE

1. Reference List of ACP Metal Protective and Paint-Bonding Chemicals.
2. ACP Phosphate Coating Chemical Selection Chart.
3. ACP Phosphate Coating Chemical Descriptive Folder.

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Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

Business activity in general increased slightly during the week ended April 22. Department store sales, railway freight loadings, crude oil output, and construction were higher than in the preceding week, while electric power production and bituminous coal production declined. The *New York Times* index of activity for the week ended April 22 stands at 156.8, as compared with 153.7 in the preceding week and 145.3 a year ago.

Sales of department stores during the week ended April 22, as reported by the Federal Reserve Board, were 279 per cent of the 1935-39 average, as compared with 254 in the week before. At this level, the volume of sales was five per cent more than in the corresponding week of last year. The total reported since the beginning of the year was three per cent less than the comparable sum in 1949.

Electric power production declined slightly during the week ended April 22. Output, however, was 9.8 per cent above the corresponding amount in 1949, as compared with an advance of 9.7 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 722,644 cars, 2.2 per cent more than the figure for the week before and 6.1 per cent below the corresponding number recorded in 1949.

Crude oil production in the week ended April 22 averaged 5,026,100 barrels daily, 27,300 more than in the preceding week and 52,580 above the comparable output a year ago.

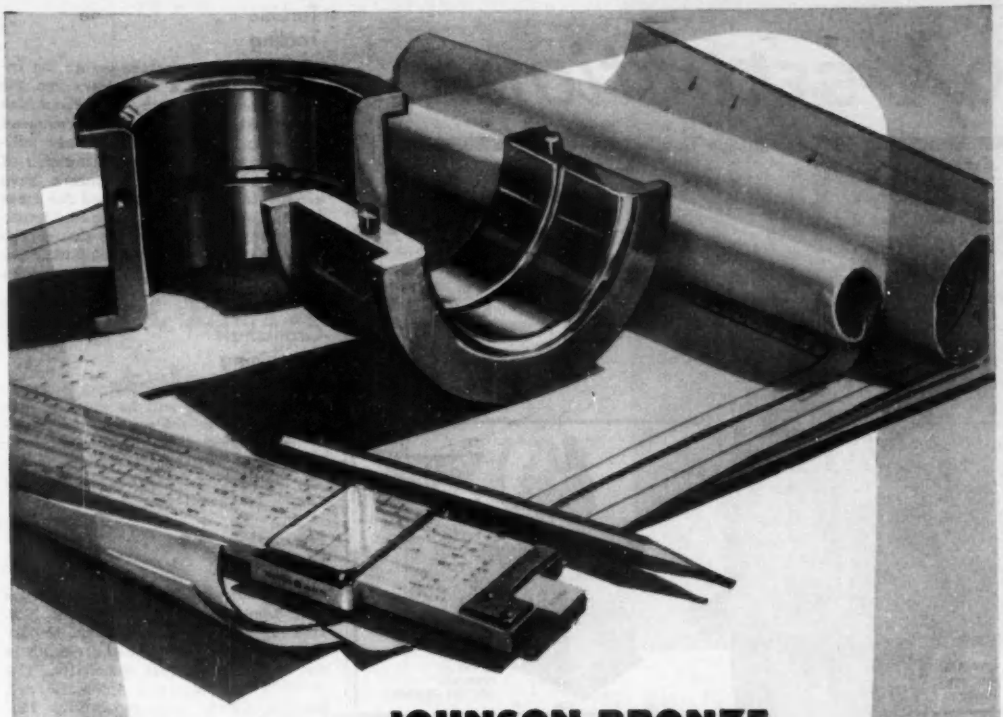
Production of bituminous coal and lignite during the same week is estimated at 11,145,000 net tons, 215,000 less than the output in the week before and 371,000 below the corresponding quantity in 1949.

Civil engineering construction volume reported for the week ended April 27, according to *Engineering News-Record*, was $219,148,000, or 18 per cent more than the preceding weekly figure and 50 per cent above the comparable sum in 1949. The total recorded for 17 weeks of this year was 41 per cent more than the corresponding amount in 1949. Private construction for the period was 64 per cent above that a year ago, and public construction increased by 18 per cent.

The wholesale price index of the Bureau of Labor Statistics during the week ended April 25, at 153.7 per cent of the 1926 average, was one per cent more than in the preceding week and 1.2 per cent below the corresponding figure in 1949.

Member-bank reserve balances increased $112 million during the week ended April 26. Underlying changes thus reflected include an increase of $213 million in Reserve bank credit and decreases of $30 million in money in circulation, $3 million in Treasury cash, and $52 million in non-member deposits and other Federal Reserve accounts, accompanied by an increase of $186 million in Treasury deposits with Federal Reserve banks.

Total loans and investments of reporting member banks increased $71 million during the week ended April 19. A decrease of $145 million in commercial, industrial, and agricultural loans was recorded. Total business loans on April 19 at $13,571 million were $733 million below the comparable figure of a year ago.



JOHNSON BRONZE *Welcomes* BEARING PROBLEMS

Before designing sleeve bearings for any application, Johnson Bronze engineers make full use of considerable information. They study load, shock, speed, temperature, corrosive conditions and other service considerations. As satisfactory performance of the motive unit is dependent on bearings that meet these operating conditions, complete data is imperative. Based on these studies, Johnson Bronze may recommend any one of several types of sleeve bearings and will design it to meet all requirements. This is the type of bearing service you can use at a profit. Write, wire or call today for an appointment.

for the ENGINEER

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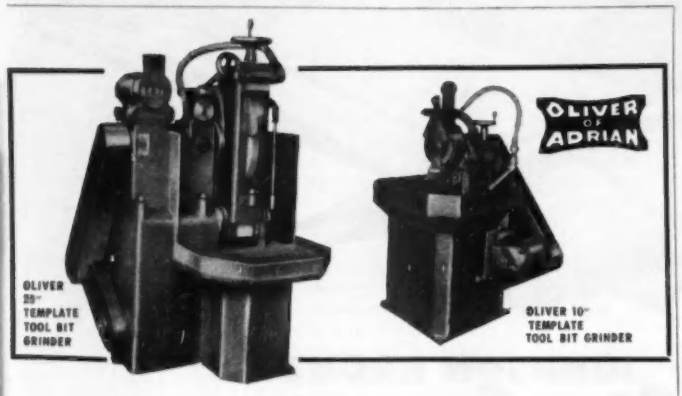
Observations

By Joseph Geschelin

Confirms Scoops

In recent travel your editor has seen hundreds of thousands of dollars worth of machine tools in the process of erection. They cover equipment for machining new V-8 engine parts, V-8 crankshafts, and an additional automatic transmission. Here is tangible verification of recent items in AUTOMOTIVE INDUSTRIES concerning new engine and transmission programs in the offing.



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The Oliver method of single point tool sharpening is reducing costs in many automotive toolrooms by eliminating breakage, overheating, inaccuracies and slow free hand grinding.

The Oliver method *speeds grinding time to a minimum* because the complete tool is sharpened on one machine and only one setup instead of several machines.

The Oliver Template Tool Bit Grinder sharpens single point tool bits to a predetermined contour and with any combination of clearance angles desired (template controlled). Oliver Tool Grinders are self-contained, they do a complete grinding operation. This grinder is exceptionally efficient in grinding hard or sintered metals because of the large volume of coolant (approximately 25 gallons of water per minute). The Oliver Grinder will reduce your tool inventory, save lost time and reduce tool breakage. Write today for the Oliver bulletin which gives you complete technical information.

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AUTOMATIC DRILL GRINDERS · TOOL & CUTTER GRINDERS—DRILL POINT THINNERS—TEMPLATE TOOL GRINDERS—FACE MILL GRINDERS—DIEMAKING MACHINES

Turbine Tooling

We noted in a lecture before the Industrial College a few years ago the urgent need for setting up a committee of industrial experts to recommend manufacturing techniques for new military products. Since then a number of major machine tool producers have commented to us on the need for mass production methods in the manufacture of jet engines. The fact is that in the event of an emergency we may not have the means for producing jet engines in large volume.

Crankshaft Machining

We understand that the art of crankshaft machining will be given a new twist by one of the well known equipment builders. It seems that this machine tool maker has developed a transfer machine line for one of the new engine crankshafts.

Flamatic Hardening

The Cincinnati Flamatic principle has been applied to widely different heat treating operations throughout the industry. One of the most dramatic is the hardening of cast camshafts. The machine is completely automatic and capable of very high productivity. Another successful application is the hardening of starter ring gear teeth.

Engine Progress

Subject only to announcement dates, we know definitely that at least two manufacturers will be in production on V-8 engines; and additional valve-in-head Sixes also are in the cards. On the face of the evidence the trend in engine design is strongly: first to overhead valve arrangement; and second, to V-8's. This evidence appears to rule out consideration of various forms of unorthodox combustion chamber designs which stress mechanical octanes rather than premium fuels of high octane ratings. The current trend also implies an almost overwhelming trend to the adoption of hydraulic valve lifters.

Jet Drive

It's quite confusing to the public to read newspaper reports about jet engine drives for motor vehicles now being tested in England. Obviously what they are talking about is an application of the gas turbine. In the USA Boeing is continuing its development of the 190-hp gas turbine. Whether or not this work will result in a tangible improvement in fuel economy and whether it can be demonstrated that a complete power package can be built competitively with conventional gasoline power plants still remains to be demonstrated.

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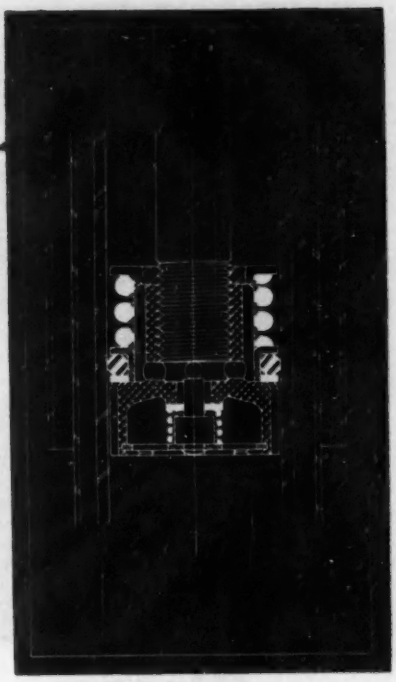

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An important factor in the ride and handling characteristics you engineer, is the uniformity of action of shock absorbers. At last, it is possible to achieve a high degree of uniform action throughout the entire temperature range, and through longer, harder service.

Gabriel's exclusive "sealed piston" construction, for the first time, offers a shock absorber that completely controls the flow of fluid between the piston and cylinder wall. Original calibrations are less affected by piston fit, wear or changing oil viscosity.

Longer life of uniform ride over a longer period of time is assured by the reduced possibility of scoring piston or cylinder walls.

Long recognized as the leading designer and manufacturer of ride control devices, Gabriel supplies shock absorbers to an expanding list of manufacturers of passenger cars, trucks, busses and taxicabs.

Write today for complete information about Gabriel's outstanding new design.

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*Gabriel patents referred to are Nos. 2,369,007, 2,394,356, 2,396,227. Other patents pending.

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cult product is made of the proper
durometer, to very accurate dimen-
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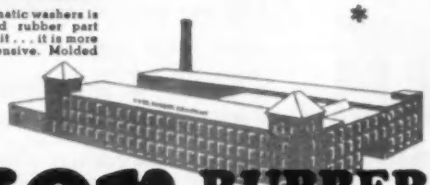
For 92 years Tyer has been doing remarkable things with rubber. Tyer originated WHITE RUBBER and ELASTIC WEBBING. Tyer's war products ranged from giant pontons to tiny earplugs made to a tolerance of one thousandth of an inch. Today Tyer leads in SERVICE to INDUSTRY. Many of the country's finest products have vital rubber parts made by Tyer. These famous manufacturers know that Tyer does unusual things with rubber.

This soap dish for automatic washers is an intricately-fashioned rubber part that replaces a metal unit . . . it is more efficient and less expensive. Molded by Tyer.

If there is a rubber part in your product (old, new or proposed) Tyer technicians will give you the utmost cooperation in putting all Tyer's 92 years of experience at your service. Ask the Tyer representative. Write to us in Andover or to the nearest branch.



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AIRBRIEFS

(*Continued from page 52*)

turboprop engine years ahead of anything here or abroad. When you can get power at a cost of less than one-half pound per horsepower, when you can put that power in your present airplane, and when the conversion gives you increased performance (roughly 25 percent) at little or no increase in fuel cost, then you've got a mighty powerful argument for exactly what the airlines are doing today. So the turbojet airliner can go back and sit down for a while and wait its turn in five to seven years.

Radio Operators Passe?

The flight radio operator never got even a toe-hold on domestic airliners and although they were sprinkled about the airlines 20 years ago, they quickly disappeared and the flight crew assumed full responsibilities for radio communication two decades ago. Not so, however, on overseas flights which, from the beginning, have counted the radio operator as a vital member of the crew. In effect, however, the radio operator has come to mean simply a man who knows the Morse Code (aside, of course, from his obvious qualifications for the service and repair of the equipment) and the growing use of voice channels in communication is gradually putting him out of business since anyone who can tune to a station and talk qualifies for the job. Last stronghold for the CW operator has been the 500 kc international distress frequency used by ships at sea, a CW frequency exclusively. More than a year ago the international airlines starting laying off radio operators as the shift from telegraph to telephone became pronounced. Finally, the Flight Radio Officers Association and a CIO Maritime Committee took the matter to the Civil Aeronautics Board charging that life and property were being endangered by the actions. (Actually, the Civil Air Regulations do not require flight radio operators or specify what radio equipment must be carried, other than requirements that it be adequate and suitable for the route to be flown.) The operators argued that inability to send distress calls on 500 kc meant that ships in the vicinity could not be summoned quickly in the event of a mid-ocean ditching. However, the CAB has decided that airliners in distress will be adequately protected by transmitting distress messages on the route frequency in use and that shore stations can summon aid from ships at sea with little or no loss of time. But the Board ruled that overseas carriers must continue to carry 500 kc communication equipment and that any member of the crew, particularly the navigator, qualified is authorized to use the equipment. Which sounds the knell for the flight radio operator.

When detecting temperature by radiation method . . .

● ***Quick-sighting optical system*** **lets user select desired target easily, and then check the sharply-defined area which the Rayotube sees. Increased sharpness is also of benefit when radiation comes from end of a closed tube.**

● ***Hermetically sealed construction*** **at lens, window, and leadwires keeps out dust and gases. New design guards inherent accuracy and stability, even with high or rapidly changing Rayotube housing temperatures.**

Which do you want?

If you already know about Rayotubes, we'll send you brief material to bring you up-to-date on the new model. If you want the full story on all Rayotubes, ask for Cat. N-33B. Please specify. Write Leeds & Northrup Company, 4966 Stenton Ave., Phila. 44, Pa.

Built to work with all Micromax and Speedomax Rayotube instruments, this new Rayotube is an important advance in radiation pyrometry. Present users of Rayotubes, as well as future ones, will find this completely new, advanced design detector unusually easy to apply, especially to such equipment as slab furnaces, soaking pits, open-hearths, ceramic kilns . . . wherever operating conditions are severe.

Purposely designed for easy, low cost replacement, the new Rayotube fits all existing Rayotube mountings. This unit requires no protection against high ambient temperature unless its housing temperature exceeds the very high figure of 350 F. Below that point, any previously installed water- or air-cooling can simply be turned off or disconnected.

Temperature control engineers will welcome these and many other new concepts of design built into this highly versatile temperature detector.

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METAL POWDER SHOW

An excellent attendance of members and users was attracted by the Sixth Annual Metal Powder Association Meeting and Show held in Detroit last month. Twenty-two exhibitors displayed the latest developments in metals, products, and equipment. It may be of interest to our readers that, in the main, the field covered by the exhibits has been reviewed substantially in AUTOMOTIVE INDUSTRIES. At the present time there is considerable interest in exploiting stainless steel powders, particularly for military applications. A new type of stainless steel formulation was described at the meeting by George Stern, American Electro Metals Corp.

Some interesting sintering machines were featured by Lindberg Engineering Co., Electric Furnace Co., and Harper Electric Furnace Co. Molding machine manufacturers, were represented by Kux Machine Co., F. J. Stokes Machine Co., and the Arthur Colton Div. of Snyder Tool & Engineering Co. Three new molding machines developed by Stokes will be announced shortly. Arthur Colton is bringing out a rotary press, a hydraulic press, and an unusual type of hydraulic sizing press.

At the business meeting, B. T. du Pont, sales manager, Plastic Metals Division of National Radiator Co., was re-elected president. T. L. Robinson, the Wel-Met Co., was re-elected vice president, and W. P. Schenk, superintendent of the Scrub Oaks Division of Alan Wood Steel Co., was elected chairman of the board. New directors elected were T. L. Robinson, the Wel-Met Co., and H. W. Fischer, American Electro Metal Corp. E. P. Palmer, Metals Refining Co., W. P. Schenk, Scrub Oaks Division of Alan Wood Steel Co., and F. S. White, S. K. Wellman Co., will continue as directors of the Association.

Considerations of cost accounting procedures related to the manufacture of powder metal products were discussed by A. J. Langhammer, president of Amplex. The closing luncheon meeting was treated to an inspirational talk on the philosophy of research by T. A. Boyd of General Motors Research.

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SPECIAL APPLICATION
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Sturdy and reliable, explosion proof construction, helical geared fuel transfer pump motor.

By using Lamb Electric *motor parts* or a complete *frame motor* —engineered for the *exact* requirements of your application—you may gain these advantages:

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1. Reduced cost, weight, space.
2. Exact mechanical and electrical characteristics.
3. Thorough dependability.

IN THE PRODUCT—
4. Better performance.
5. Improved eye-appeal.
6. Compactness, less weight.

Aircraft hydraulic pump motor with maximum output, minimum weight. Adaptable to many heavy-duty industrial applications.

Our engineering department will be glad to team up with yours to help achieve these results. *The Lamb Electric Company, Kent, Ohio.*

They're Going Into America's *Finest* Products

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SPECIAL APPLICATION FRACTIONAL HORSEPOWER MOTORS

Economies with Coated Gray Iron

Recent advances in methods of applying metallic and non-metallic coatings to gray iron castings have revolutionized previous ideas regarding the possible fields of application of iron castings. Coatings of any desired metal can be produced by molten metal spraying, dipping the castings in molten metal, heating in contact with molten metallic salts, electroplating using improved techniques, or deposition of the required surfacing metal by oxy-acetylene or arc welding methods. Non-metallic coatings, including all types of organic and inorganic materials, are best applied by spraying, brushing or dipping followed usually by suitable baking or firing treatments. Properly coated castings exhibit immunity to the severest corrosive, wear and heat conditions.

These developments have been described and correlated in two technical bulletins issued by the Gray Iron Founders' Society, Cleveland. Since substantial economies are inherent in the use of a comparatively inexpensive base metal such as gray iron, by eliminating the necessity of obtaining highly alloyed or pure metal components in massive form, coated gray irons should definitely ease procurement problems.

FOR INSTANCE
mouldings for quality needs
always beautiful!
solid!
Superior
STAINLESS STRIP STEEL
easy to make
because the Stainless is Superior!
easy to sell
because the luster is permanent!
SUPERIOR Stainless Strip Steel is the choice of fabricators meeting quality-moulding demands, *because*... Superior handles just right! The long, production-speeding coils are uniformly dependable in composition. Gauge, width, temper, finish always are as specified.
Your customers benefit by the ever-bright, wearproof beauty of Stainless—*you* benefit when you standardize on SUPERIOR. Let us serve you!
Superior Steel
CORPORATION
CARNEGIE, PENNSYLVANIA

WHITE TAMES Chassis Weave

...with bearings by SKF

Super Power White Series 3000 is the last word in ultra-modern truck design. It's engineered to deliver at lowest cost per unit and mile . . . and to make more deliveries in an average day. A big factor in White's efficiency and economy of operation is the fact that they're equipped with the SKF Rubber-Mounted Propeller Shaft Box . . . permanently sealed against dust, dirt and road splash. The rolling alignment that accommodates chassis weave is permanently built into the SKF Self-Aligning Ball Bearing . . . correct alignment of the shaft center is constantly maintained. It's refinements like this . . . the direct result of SKF's continuing program of engineering research . . . that have made SKF Ball and Roller Bearings preferred by the automotive industry. Specify them and you specify complete dependability . . . high efficiency . . . minimum maintenance and operating costs.

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA., *the Pioneers of the Deep Groove Ball Bearing – Spherical Roller Bearing – Self-Aligning Ball Bearing.*

7080

SKF

BALL AND ROLLER BEARINGS

8 REASONS WHY SKF IS PREFERRED BY ALL INDUSTRY

INTEGRITY — CRAFTSMANSHIP — METALLURGY — TOLERANCE CONTROL

SURFACE FINISH — PRODUCT UNIFORMITY — ENGINEERING SERVICE — FIELD SERVICE

Men in the News

(*Continued from page 25*)

Sun Oil Co.—The appointment of **Willard W. Wright** as General Sales Manager, has been announced.

United States Steel Corp.—**Thos. M. Stinson** has been appointed General Manager of Sales, with headquarters in New York City. He is succeeded by **G. P. Wardley, Jr.**, as Sales Manager, St. Louis district.

General Electric Co.—The following appointments have been announced: **C. C. Clymer**, Manager, Materials Handling & Testing Equipment, Industrial Engineering Div. **P. M. Deal**, Administrative Asst. Fractional Horsepower Motor Div.; **C. E. Burke**, Manager, Sales Specialty Transformer and Ballast Div. and **G. C. Harvey**, Div. Engineer, Ballast Eng. Div.

The Midland Steel Products Co.—**David S. Greer** has been elevated to the positions of Vice-President and Treasurer.

United States Rubber Co.—The appointment of **C. H. Madsen** as asst. to operations manager, synthetic rubber div., has been announced. **T. A. McCoy** has been named factory manager of the div.

Ethyl Corp. — The appointment of **William T. Hack** as Manager of the Product Development Dept., has been announced.

P. R. Mallory & Co., Inc. — **J. E. Templeton**, Manager of the Los Angeles branch of the company, is succeeding **Walter Harvey** as Manager of the company's wholesale div.

Gould Storage Battery Corp.—**K. A. Vaughan** has been advanced to the newly created position of Manager Sales Engineering.

Wilkening Manufacturing Co. — **Harry C. Best** has been promoted to Midwest Div. Mgr.

Handy & Harman—**Frank C. Jones**, Manager of the company's Bridgeport plant, has been elected a director. **Thomas G. McMahon**, formerly a director, has resigned.

Fruehauf Trailer Co., of Canada — **L. C. Harland** has become Vice-Pres. and Director of Sales; **Ferdinand Mercier**, Branch Mgr. at Montreal and **Donald R. Steel**, Sales Mgr. of Canada.

Four Wheel Drive Auto Co. — The appointment of **Lloyd Pernot** to the position of manager of National Accounts and the appointment of **John Thompson** as Director of the Service Div., succeeding Mr. Pernot have been announced.

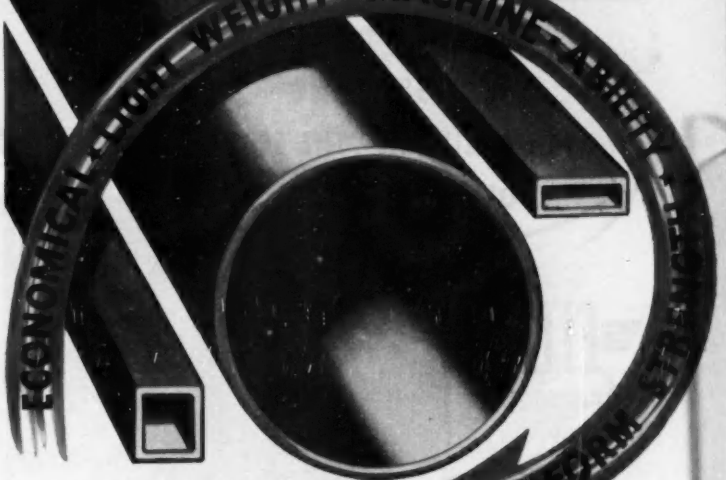
Wisconsin Motor Corp.—The appointment of **Phil Norton**, General Sales Manager of the company, as a Vice-President, has been announced.

The ABC of MST

A LWAYS MAKES POSSIBLE
B ETTER PRODUCTS AT LOWER
C OST

Michigan
The Modern Electric Resistance
WELDED
STEEL TUBING

ECONOMICAL — LIGHT WEIGHT — MACHINE — UNIFORM STRENGTH



ROUND
¼" to 4" O. D. 9 to 22 gauge
SQUARE-RECTANGULAR
½" to 2" 20 gauge 1" to 2¾", 14, 16, 18 gauge

Can be Bent,
FLANGED, EXPANDED, TAPERED, DEPRESS BEADED, EXPAND BEADED, ROLLED, EXTERNAL UPSET, INTERNAL UPSET, SPUN CLOSED, FORGED, BEVEL FLANGED, FLATTENED, SWAGED, FLUTED.

Consult us for engineering and technical help in the selection of tubing best suited to your needs.

At MICHIGAN we've never admitted there are such words as, "It can't be done!" That's why we've convinced thousands of manufacturers that MICHIGAN TUBING is an ideal, cost-saving product component. No matter what you manufacture, let us prove that the use of MICHIGAN TUBING can give you a better product and save you money.

A Quality Product, can be worked in your plant or prefabricated by MICHIGAN.

Michigan STEEL TUBE PRODUCTS CO.
33 Years in the Business
9450 BUFFALO STREET • DETROIT 12, MICHIGAN
FACTORIES: DETROIT, MICHIGAN • SHELBY, OHIO

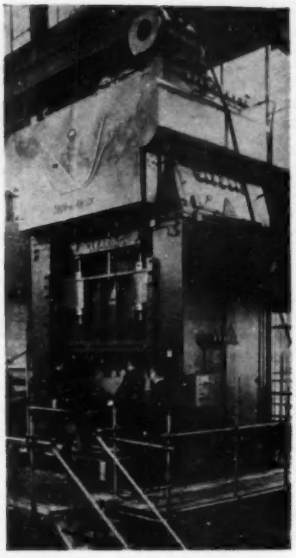
DISTRIBUTORS: Steel Sales Corp., Detroit, Chicago, St. Louis, Milwaukee, Indianapolis and Minneapolis—Miller Steel Co., Inc., Hillside, N. J.—C. L. Hyland, Dayton, Ohio—Dirks & Company, Portland, Oregon—James J. Shannon, Milton, Mass.—Service Steel Co., Los Angeles, Calif.—American Tubular & Steel Products Co., Pittsburgh, Pa.—Strong, Carlisle & Hammond Co., Cleveland, Ohio

• PRODUCTION • NEW EQUIPMENT • PLANT •

For additional information regarding any of these items, please use coupons on page 54

J-68—Press For Forming Inner Door Panels

A gain of 70 per cent or more in productive speed while retaining the actual drawing speed of conventional presses is said to have been demonstrated recently by the first of the new "HiProDraw" presses completed by Clearing Machine Corp., Chicago, Ill.



Clearing "HiProDraw" press for forming automotive inner door panels.

It forms automotive inner door panels complete in five seconds per piece.

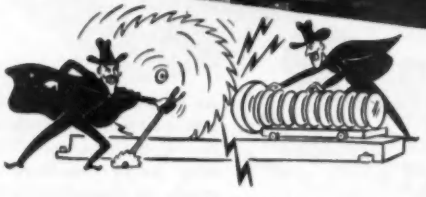
The Clearing "HiProDraw" is a mechanical, double action press differing from previous double action machines in the linkage arrangement which controls movement of the outer and inner slides. The latter moves much more rapidly during the non-drawing portions of its cycle. The physical characteristics of the metal being worked naturally limit the speed of the draw itself, and the new linkage was designed to permit more strokes per min without tearing the sheet.

Maximum speed for this type of draw is stated to have previously been considered as seven strokes per min, and even this speed is not always attempted. In contrast, the new Clearing operates regularly at twelve strokes per min. Total capacity is 750 tons, of which 450 is on the inner, or forming, slide. The press measures 108 in. be-

Formed inner door panel being removed from Clearing press by Sahlin iron hand.

ELCO SLOTTING
PUTS QUALITY IN "THE SCREWS YOU LIKE TO USE"

ELCO Screws



Making a Good Slot

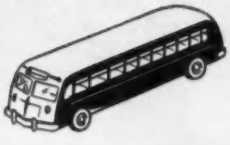
This close-up shows one of our slotters in action, automatically turning out slots that are accurate, uniform, well-centered, and smooth.

Slotting, done wrong, can sure mess up a run of screws that may be otherwise good. It is our aim at Elco to see that we *never* turn out screws with anything but *good* slots. We work to *close tolerances,* well inside of established standards. (Recently we ran a million or so little 3-48's for a switch manufacturer, on which the slots had to be more accurate and uniform than standard so that the screws could be picked up and started with a flat screwdriver.) Elco slots are carefully *centered,* and our slotters are equipped with built-in burring units for a *smooth* finish. Part of our slotting department is shown in the picture above — the *top* picture, that is. Good slotting is one of the signs of good screws — ELCO screws.

ELCO TOOL & SCREW CORP., 1914 Broadway, Rockford, Ill.

Balanced Cooling!

This Long radiator serves a stationary Diesel engine. With bolted stampings for top and bottom tanks, this type can be quickly disassembled for cleaning.



You get highest efficiency when your engine cooling requirements are met by a *balanced* system. Radiator, fan, pumps and hoses must work in harmony—with each other, and with the engine—for maximum performance in heat dissipation.

Since 1902, we have designed and produced millions of tailored-to-fit radiators for passenger cars, trucks, buses, tractors and stationary engines.

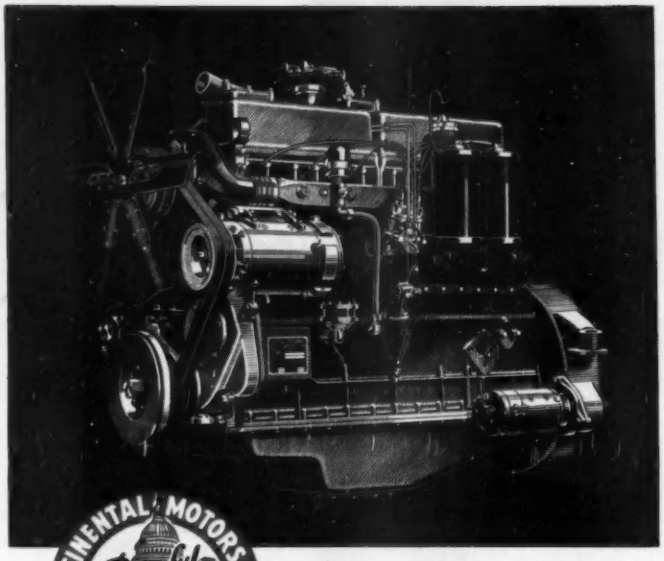
ENGINEERING B-W PRODUCTION

LONG

LONG MANUFACTURING DIVISION BORG-WARNER CORPORATION Detroit 12 and Windsor, Ontario, Canada

TORQUE CONVERTERS • CLUTCHES • RADIATORS • OIL COOLERS

THERE'S A RED SEAL ENGINE FOR EVERY TRANSPORTATION JOB



CONTINENTAL MOTORS · Powerful as the Nation · AMERICA'S STANDARD

S-6749 TRANSPORTATION ENGINE

Built for heavy-duty service. 250 h.p. at 2600 r.p.m. Six cylinders, overhead valves. Heat-treated, pressure-tested block and head. Exclusive Continental system of individual porting. Full-length water jackets with directed coolant flow. Tocco-hardened crankshaft journals. Leakproof water pump. Write for Bulletin TS48749.

Continental Motors' line of transportation engines is both diversified and complete. There are 24 different models, with net usable horsepower ranging from 10 to 230. Red Seal built-for-the-job power is available for automobiles—taxicabs—city, school and interurban buses—highway trucks, tractors and street maintenance equipment—fire-fighting apparatus—door-to-door delivery units—industrial trucks of all types—and virtually all other vehicles for highway and off-highway use. Red Seal engines are built in L-head and overhead-valve types, and for use with butane and Diesel fuel as well as gasoline.

Conversion to Continental Red Seal can be made with minimum installation changes. In writing for further details, kindly mention specific application.

Continental Motors Corporation

MUSKEGON, MICHIGAN

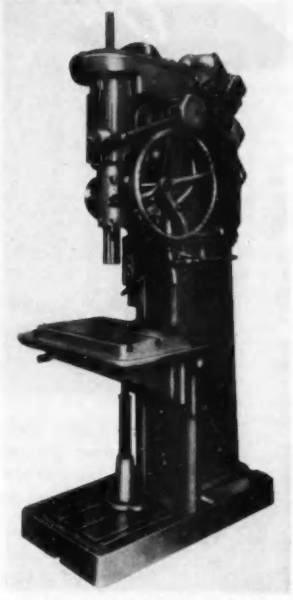
NEW PRODUCTION AND PLANT EQUIPMENT

For additional information please use coupon on page 54

tween housings, and will draw and lift out a maximum of 14 in. The blank-holder stroke is 22 in. Other sizes and capacities of presses having the "Hi-ProDraw" feature are now in process of production.

The press is driven by one 75 hp motor driving through a single Tornadyne clutch and brake unit. The press is equipped with a portable push button control so that one man operation will be both safe and practical. In the test run at the Clearing plant the automatic feed was not installed, but the Sahlin iron hand unloader was in operation, as illustrated.

J-69—Drilling Machine



Placed on the market by Barnes Drill Co., Rockford, Ill., is this No. 201¼ drilling machine with which speed changes are controlled by one lever and feed changes controlled by a single dial. An automatic depth control trips out the feed at predetermined position for drilling operations, or trips an electric reverse for tapping operations. On regular drilling operations the spindle continues to rotate and is returned to starting position by a hand wheel, or automatically with coil spring attachment. On tapping operations with thread-leading feed attachment the feed remains engaged and the direction of rotation is tripped to forward at the upper position.

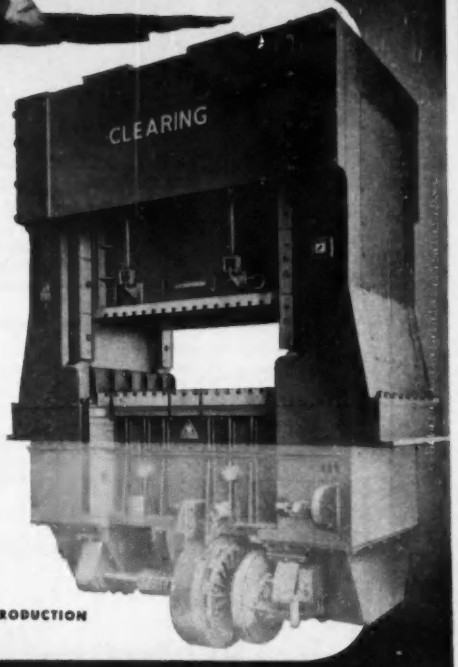
(*Turn to page 74, please*)

Just another horse?

Before a race the crowd identified him by number. Horses look pretty much alike. But everybody knew him at the finish line, because only once in his life did he fail to cross it first. *This* horse was Man o' War.

Presses look pretty much alike, too—in pictures. But in the shop, under production conditions, you can spot a Clearing press by the work it turns out and the steady way it keeps at it with minimum interruption for attention to either dies or press. That's why you'll find so many Clearings in plants where real costs are recognized and controlled.

It will pay you to discuss your metalworking problems with one of our sales engineers. Call or write without obligation.



CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

CMC CLEARING

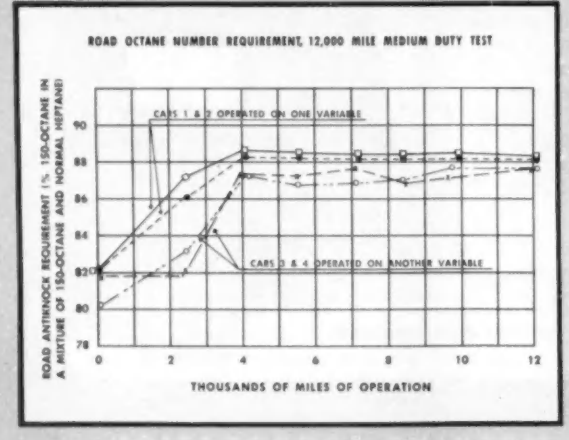
CLEARING MACHINE CORPORATION

6499 WEST 65TH STREET · CHICAGO 38, ILLINOIS

DuPont Research

Factors Affecting Road

To obtain comparative results in deposit studies, cars of the same make and model are operated uniformly under carefully controlled medium duty passenger car conditions. Four cars of a different make, not shown in this picture, are also used in this investigation to get comparisons between cars of different makes.



MAJOR CONSTITUENTS IN DEPOSITS FROM ROAD TEST ENGINE AT END OF 12,000 MILE MEDIUM DUTY TEST

Intake Valve Head	$(PbBr_2)x \cdot (PbCl_2)y$ $PbSO_4$
Piston Top	$(PbBr_2)x \cdot (PbCl_2)y$ $PbSO_4$
Cylinder Head	$(PbBr_2)x \cdot (PbCl_2)y$ $PbSO_4$
Exhaust Valve Head	$PbSO_4$ $PbO \cdot PbSO_4$

MAKE DU PONT THE SOURCE FOR ALL OF YOUR GASOLINE ADDITIVES

Tetraethyl Lead Compounds (Motor Mix—Aviation Mix) • Antioxidants • Metal Deactivator • Dyes

Investigating the Octane Number Requirement

As a supplier of tetraethyl lead compounds to the refining industry, Du Pont is vitally concerned with all factors affecting fuel and engine performance. In its continuing program of research, Du Pont is studying many of these factors. One of these studies is an investigation into the chemical nature of engine deposits and the effect of these deposits on fuel performance.

All liquid fuels burned in internal combustion engines produce combustion chamber deposits, the composition of which will vary with the composition of the fuel, the type of lubricating oil and operating variables. Octane requirement increases with engine operation but there is little information on the mechanism of this effect. Du Pont is working toward a better understanding of this problem which it is hoped will result in answers that will permit reducing deposit harm.

One phase of this investigation is devoted to deposit studies in a fleet of passenger cars operated on the East Coast under medium duty conditions. These cars travel in convoy and are driven uniformly under carefully controlled conditions. To insure uniformity, drivers are even rotated each shift and car positions changed in the convoy.

Tests are run for 12,000 miles over a 35 mile closed course. Operation for each section of the course is fixed with definite periods of acceleration, idle and shutdown. Speeds vary from 10 to 50 MPH. Two cars are always operated on one variable to serve as checks on each other.

Representative data being obtained is shown by the curves on the page opposite. For this particular study, cars 1 & 2 were operated on one variable, and cars 3 & 4 on another variable. It will be noted that there is extremely close correlation between cars operated on the same variable, in both cases there being no real difference in equilibrium octane number. This indicates very good reproducibility of results permitting accurate comparisons.

The analysis of deposits from one of these cars at the end of a 12,000 mile test is also given on the opposite page. It can be seen that deposits are both complex in composition and vary widely throughout the engine.

This is another in a series of advertisements reporting on Du Pont research projects of mutual interest to the automotive and petroleum industries. It is believed that answers from these studies will help both industries to satisfy better the motorist's needs.

DU PONT
REG. U.S. PAT. OFF.

Better Things For Better Living
...Through Chemistry

Petroleum Chemicals

E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Petroleum Chemicals Division • Wilmington 98, Delaware

District Offices: Wilmington, Del. · Chicago, Ill. · Tulsa, Okla. · Houston, Texas · Los Angeles, Calif.

District Laboratories: Wilmington, Del. · Chicago, Ill. · Tulsa, Okla. · Houston, Texas · El Monte, Calif.

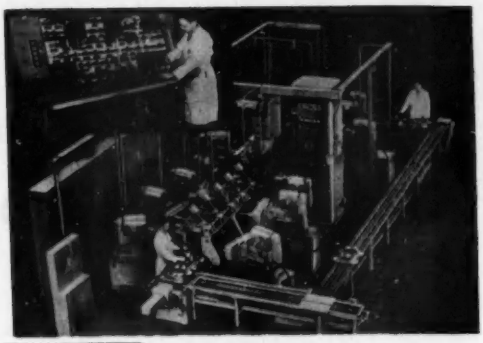
NEW PRODUCTION AND PLANT EQUIPMENT

For additional information please use coupon on page 54

(*Continued from page 70*)

J-70—Transmission Case Processing Machine

Developed by the Cross Company, Detroit, Mich., is a special machine tool incorporating several unique features for processing automatic transmission cases. A Transfer-matic — the Cross name for its machine tools equipped with automatic transfer mechanisms— the machine drills, reams, bores and taps 48 holes with 84 tools at 15 stations. A production of 67 cases per hr is obtained with only two operators working at 80 per cent efficiency.



Cross Transfer-matic machine for processing automatic transmission cases.

One operator loads the parts on a pallet type fixture which is transferred from station to station by a hydraulically-operated mechanism. Accurate location and clamping of the pallets at each station are accomplished by hydraulically-operated shot pins and cam actuated clamps.

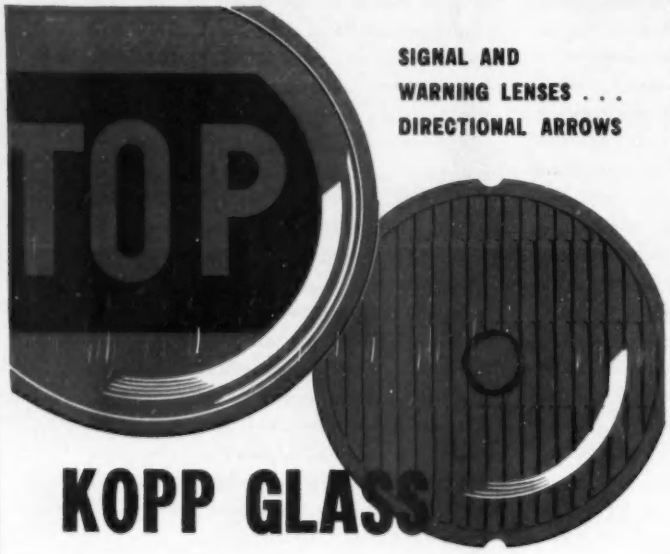
After the second operator has unloaded, the empty pallet is automatically returned to the loading station.

The work cycle is automatically interrupted if critical tools are broken or improperly set for depth.

A feature is a special bench and tool board on which are mounted two complete sets of pre-set tools and a set of tool-setting gages. As a result, operating efficiency is greatly increased and machine down time reduced. Since tools are pre-set, the need for setting or adjusting tools while they are in the machine is eliminated and the change-over is speeded.

J-71—Contour Saw and Band Filer

Combination contour saw and band filer being offered by Boice Crane Co., Toledo, Ohio, is designed to up production as much as 1000 per cent in producing maintenance parts, short run production parts, metal templates, special wrenches, wrench templates, cams, spiral parts, irregular shaped stacked parts and stamping, forming and trimming dies, producing them in minutes instead of hours required by old methods involving milling, shaping and hand filing. Precision filing, file broaching and flash removal are accomplished in one-ninth the time required by hand and one-fourth the time required by reciprocating filing machines, the company reports. Eight speeds, from 92 to 4100 blade fpm are afforded. Chart, mounted on machine, shows correct



SIGNAL AND WARNING LENSES . . . DIRECTIONAL ARROWS

KOPP GLASS

Your best choice when QUALITY is important

As the element in the vehicle signal system through which the signal is flashed, the lens must be of highest quality if the system is to function dependably. Kopp glass lenses have every characteristic you want. They are correctly engineered and made, and are accurate in color, size and design. They are non-fading, durable and have high-transmission properties.

Maintain high-quality throughout every component part of your vehicles by specifying Kopp Glass signal lenses, warning lenses and directional arrows. They may be secured from leading makers of vehicle signal equipment.

KOPP GLASS, INC.

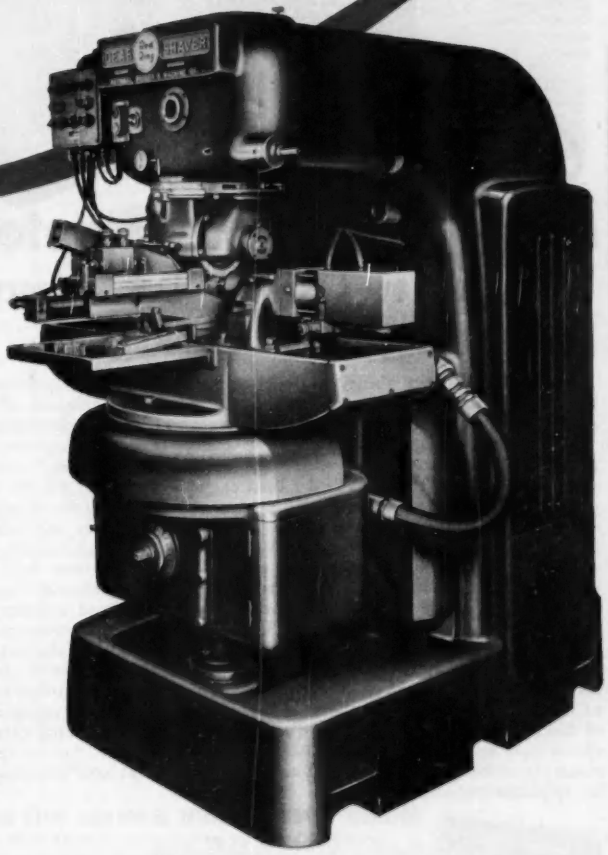
SWISSVALE, PA.

KOPP GLASS

AUTOMATIC LOADING permits you to turn out

Precision Gears with unskilled operators

at MAXIMUM PRODUCTION RATES



You as a gear manufacturer under present industrial and market conditions can correctly evaluate production equipment that:

❶ Assures extremely close gear tolerances consistently.

❷ Does not require any mechanical skill to operate.

❸ Eliminates operator fatigue and its effect on morale.

❹ Operates continuously at mass production speed.

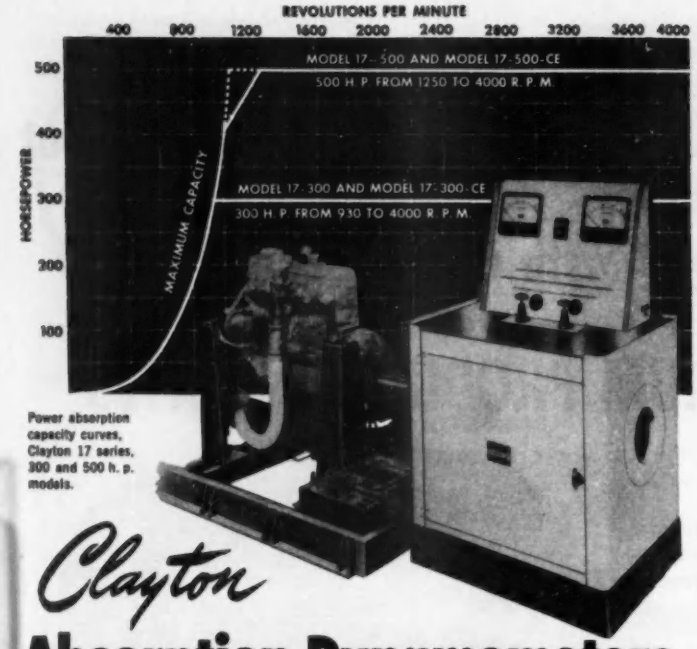
That is precisely what you can have with Red Ring Automatic Loading in connection with Gear Shaving Machines GCU or GCV.

Either of these machines so equipped can be run continuously merely by keeping a supply of work gears in the magazine and removing the finished gears. One operator easily serves a battery of machines, for the entire machining operation is entirely automatic.

Production rates are phenomenal.
Write for descriptive literature.

NATIONAL BROACH AND MACHINE CO.
5600 ST. JEAN • • • • • • • • • DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT



Power absorption capacity curves, Clayton 17 series, 300 and 500 h. p. models.

Clayton

Absorption Dynamometers

Combine Low Cost with High Accuracy and Dependable Performance

Absolute controllability . . . dependable accuracy . . . smoothness of operation . . . long life and physical compactness are all features offered exclusively by Clayton Turbo-closed System Absorption Dynamometers.

The high pumping characteristics of the power absorption unit are utilized to circulate the working fluid through a closed cooling system, in which is incorporated a heat exchanger to dissipate the heat generated by power absorption. This is accomplished without changing the quantity of water in the absorption unit. Optionally, air cooling is practical. With the Clayton Turbo-closed System Dynamometer, it is possible under many conditions to absorb 100 horsepower with less than one pint of water. Outstanding result of this exclusive Clayton development is the ability to maintain any torque load indefinitely.

Used by the U. S. Navy and U. S. Ordnance, Clayton Dynamometers provide the long life and trouble-free service demanded by the world's largest users of dynamometers. Equipped to receive the finest of laboratory instrumentation, they may also be adapted for various other types of instruments of less accuracies and lower cost. Standard equipment of Model 17-500-CE (illustrated above) includes direct reading electric speed and horsepower meters. Mail the coupon below for complete book describing the Clayton Turbo-closed System and illustrating its application.

AUTOMOTIVE ENGINEERS, ENGINE RE-BUILDERS, FLEET OPERATORS

Have your secretary mail the coupon below today and let us send you, free, this book on Clayton Absorption Dynamometers. It belongs in your technical library.

Clayton Manufacturing Company • Box 550, El Monte, Calif.
Send us your book, "Clayton Absorption Dynamometers"

NAME _____

FIRM _____

ADDRESS _____ CITY _____

NEW PRODUCTION AND PLANT EQUIPMENT

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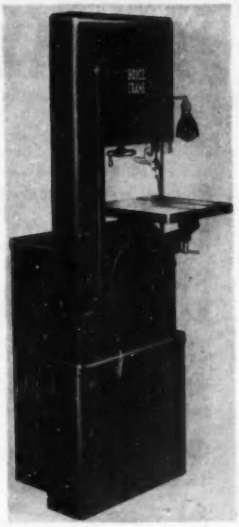
speed for accurate inside, outside and contour sawing of wood, sponge rubber, hard rubber, plastics, bakelite, masonite, asbestos, synthetic glass, transite,



Boice Crane 14-in. combination contour saw and band filer

bronze, cast iron, bar and sheet steel, tool steel, brass, steel and aluminum tubing; and for filing metals and other industrial materials.

J-72—All-Hydraulic Die Casting Machine

Recent die casting machine development of the Hydraulic Press Mfg. Co., Mount Gilead, Ohio, is the Model 400-M, a self-contained, all-hydraulic machine for producing castings in magnesium, aluminum, or base copper alloys. Castings relatively free of porosity are secured with this machine by means of high sustained injection pressure through the cold chamber injection system and by confining these pressures within the die cavities. The injection plunger is returned hydraulically. The injection speed is governed through the control of the rate of discharge of the oil ahead of the injection piston.

The hydraulic die clamp for "live" positive die closing and sealing of the die halves consists of a double action ram. The main ram is equipped with a

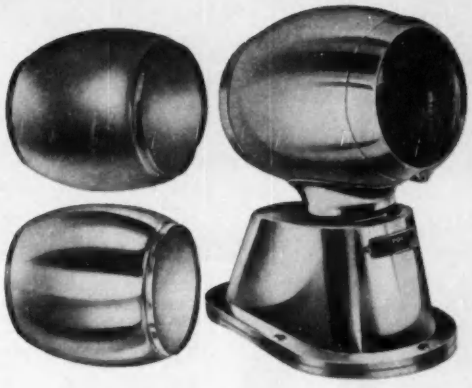
A LESSON IN SAVING—

Production Problem + REV-O-LITE ENGINEERS + REVERE = ELIMINATION OF COSTLY FORMING OPERATIONS, BRAZING AND EXTRA HAND FINISHING, PLUS FASTER PRODUCTION... AND AN IMPROVED PRODUCT

IN the development of their Rev-O-Lite, a revolving warning light for emergency vehicles, the Balford Corporation, Jacksonville, Florida, found themselves faced with a production problem regarding the cylindrical shell which contains the lights. The question was; what would be the most efficient and economical way to produce this shell that measures 6" in length and is 4½" in diameter at the ends? Should it be formed from a metal strip and brazed? Could tube be used and bulged in a die? Or, should some other method be employed?

Revere, working with the design engineers of the Balford Corporation, exchanged ideas, weighed the pros and cons of various methods; experimented. They found that by using 70/30 Revere Brass Tube in a light anneal temper, it would take the bulging in the die satisfactorily and at the same time show up well as far as grain size control was concerned. By this method, complicated and costly forming operations and brazing could be eliminated, production speeded and the shell formed without any unsightly seam. Also, no extra hand finishing would be necessary before plating.

Perhaps one of the many types of Revere Brass or one of the other Revere Metals or Alloys can help you improve *your* product —cut your production costs. Why not tell Revere's Technical Advisory Service about *your* metal problems? Call the Revere Sales Office nearest you today.



UPPER LEFT shows brass shell of the Rev-O-Lite as it comes from the bulging die. Without any extra finishing, which would have been necessary had shell been made of strip and brazed, shell is chrome plated as shown at lower left. At right is the completed assembly of the Rev-O-Lite ready for action on the roofs of all kinds of emergency vehicles such as police patrol cars, ambulances, fire trucks, etc. Chrome finish base is of cast zinc alloy.

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COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

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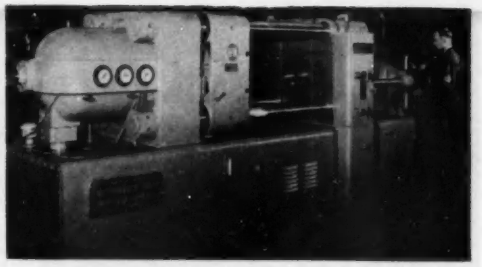
Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Los Angeles and Riverside, Calif.; Rome, N. Y. — Sales Offices in Principal Cities, Distributors Everywhere.

NEW PRODUCTION AND PLANT EQUIPMENT

For additional information please use coupon on page 54



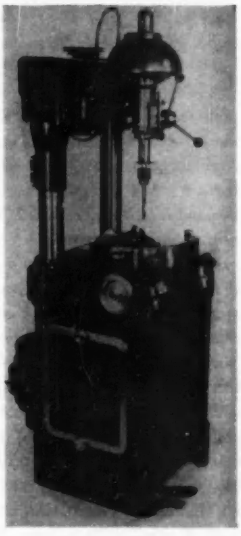
Hydraulic Press Mfg. Co. all-hydraulic machine, Model 400-M.

fast closing booster ram which closes the clamp platen to within a fractional part of an inch of the total clamp stroke. Both die opening and closing are easy and free of shock.

Die openings are controlled through electric timers. Control of die movement, clamping, and injection plunger movement is automatic. A hydraulic actuated cylinder provides for automatic ejection of the casting. Die clamping pressure is 400 tons. Production maximum is 125 shots per hr.

J-73—Vertical Balancing Machine

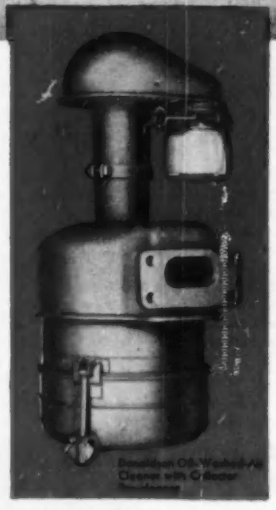
Manufactured by the R. B. Annis Co., Indianapolis, Ind., is a vertical balancing machine used for production balancing of rotating parts such as clutches, magnetos, impellers and flywheels, etc., wherever diam of the work is considerably greater than its axial length. Both the "amount" and "phase" of unbalance are indicated simultaneously by the trace on a 5 in. cathode ray tube.



Annis dynamic production balancing machine

When the work is oriented so as to light a signal lamp, the spot to be drilled for balance correction is directly under the drill point, drilling depth having already been indicated by the scale reading of the cathode ray tube trace. Precision balancing at speeds up to 75 parts per hr is possible.

(*Turn to page* 82, *please*)



Under dust conditions like those in which this crawler tractor is working, any leak in the air cleaner would let in enough dust to ruin the engine.

But that big, powerful Diesel engine is protected by a Donaldson Oil-Washed-Air Cleaner and all Donaldson Cleaners are 100% sealed, with each seam and joint air tight. As a final positive check against leaks, each model cleaner is pressure tested under water. In a Donaldson cleaner, *sealing is unlimited*, leaks are completely excluded. Air can be taken into the air cleaner only through the turbulent, double-scrubbing, oil-impinging action in the air cleaner, where better than 99 44/100% of all dust is removed.

A dust concentration like that shown above, is only one of the unusual conditions that Donaldson Air Cleaners will handle. If you want assurance that your engine will be fully protected at all times, write our engineering department.

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DONALDSON CO. (Canada) LTD.
Chatham, Ontario

DONALDSON Oil-Washed AIR CLEANERS

WORLD'S LARGEST MAKERS OF HEAVY-DUTY AIR CLEANERS

The Little Truck That Could*

ONCE there was a little truck which had not been over the mountain for a long, long time. For the mountain was a towering mountain, and the top was way up in the clouds.

But one day, the boss said, "Little Truck, you must go over the mountain." Little Truck said, "Why, I'm a short haul truck. I haven't been over the mountain in months. But I'll try."

So little Truck started up the mountain. And then the driver split a gear. And another, and then another, and then another. And all the time, Little Truck's engine was puffing and puffing.

And finally, Little Truck got right up to the peak of the mountain, huffing and puffing along in low low gear, and Little Truck said to himself:

"I think I can . . . I know I can . . . I think I can . . . I know I can . . . "

And Little Truck did. He went over the crest of the road saying:

"I thought I could, I knew I could . . . I may be old, but I still have a *Fuller Transmission* with the *right* gear ratios."

MORAL: You "*know* you can" under the toughest road and load conditions when you specify a Fuller Geared-to-Road-and-Load Transmission—for the transmission is where horsepower goes to work.

* Inspired by Piper's "Little Engine That Could," copyrighted by the Platt and Munk Co., Inc.

where horsepower goes to work

Fuller TRANSMISSIONS

FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

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SOLID ONE-PIECE Steel Frame Presses

Straight Side, Double Crank

Made in sizes up to the maximum that can be shipped on a freight car. (Larger sizes are four-piece tie rod construction).

Furnished with Niagara Air Actuated, Electrically Controlled Sleeve Clutch on sizes up to 6½" shaft. Plain or single geared, single end drive.

Furnished with Niagara Pneumatic Friction Clutch on sizes 4½" to 12" shaft. Single geared or double geared, single, end or twin drive.

Made in lengths up to 96" between gibs. (Longer lengths are tie rod frame construction).

Niagara Pneumatic drawing cushions available.

Write for specifications on sizes to fit your requirements.

MANUFACTURERS OF

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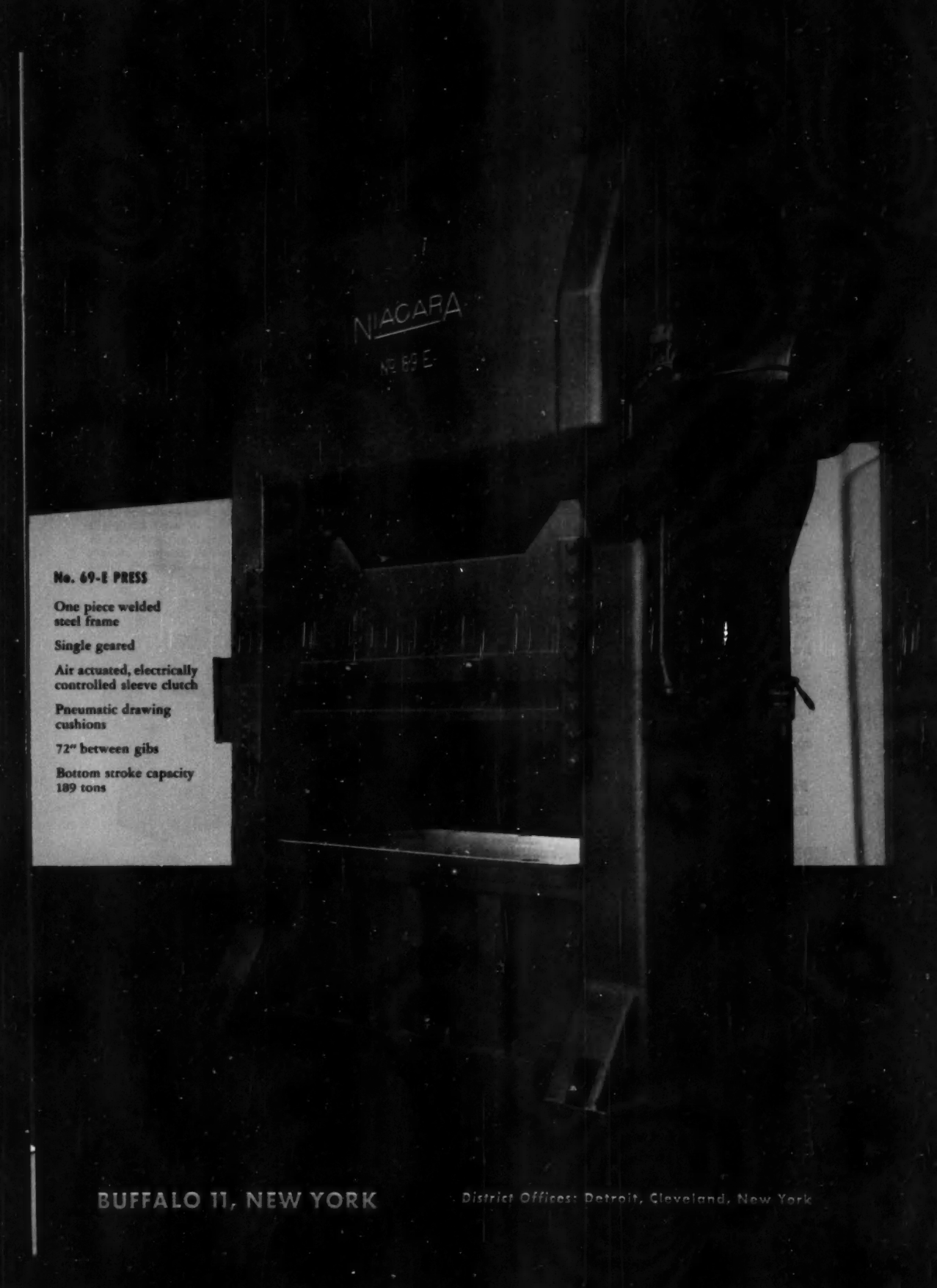
NIAGARA MACHINE AND TOOL WORKS,



No. 69-E PRESS

One piece welded steel frame

Single geared

Air actuated, electrically controlled sleeve clutch

Pneumatic drawing cushions

72" between gibs

Bottom stroke capacity 189 tons

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Axial Air
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spindle speed . . .

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Company _____
Address _____
City _____ State _____

NEW PRODUCTION AND PLANT EQUIPMENT

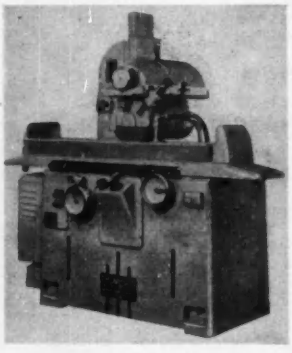
For additional information please use coupon on page 54

(*Continued from page* 78)

J-74—Tool Room Grinder

The Thompson Grinder Co., Springfield, Ohio, offers a new (Type 2F) precision tool room grinder in an 8 by 10 by 24 size, provided with all hardened and ground sliding bearings, and all feed screws of the ground thread type of extreme sensitivity.

The machine has a horizontal grinding wheel spindle and reciprocating work table grinding with the periphery of the wheel. Capacity of longitudinal work is 24 in. Maximum table movement is 29 in.; traverse 8 in.; vertical 10 in. from table to underside of 12 in. diam. wheel. Width of work surface is 8 in.; length of work surface is 24 in. with 3 in. additional clamping surface at each end. Tee slots, 3 size ⅝ in.



Thompson precision tool room grinder, type 2F

Spindle is of heat treated alloy steel mounted in four No. 209 precision preloaded ball bearings permanently lubricated. Wheel is 12 in. diam by ¾ in. face by 3 in. bore. It has a 3600/1800 rpm two speed wheel head. Grinding wheel surface speed is 5400 ft per min. Table speed hydraulic operation is 5 to 70 ft per min.; it can also be hand operated.

Vertical feed hand operation is graduated to 0.0005 in. with micrometer positive stop graduated to 0.0001 in. Hydraulic rapid traverse of cross feed speed is 240 in. per min. Hydraulic wheel truing speed is 6 in. per min; automatic hydraulic cross feed is 1/32 in. to ⅝ in.; hand operation is graduated to 0.0005 in.

(*Turn to page* 85, *please*)

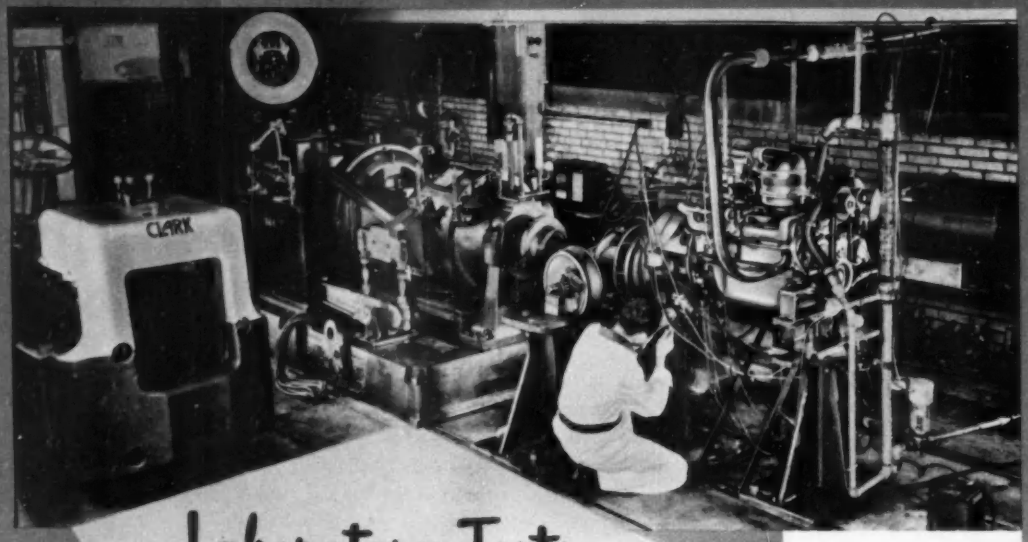
Performance records

CLARK AXLE HOUSING

TURN PAGE FOR OTHER CLARK PRODUCTS

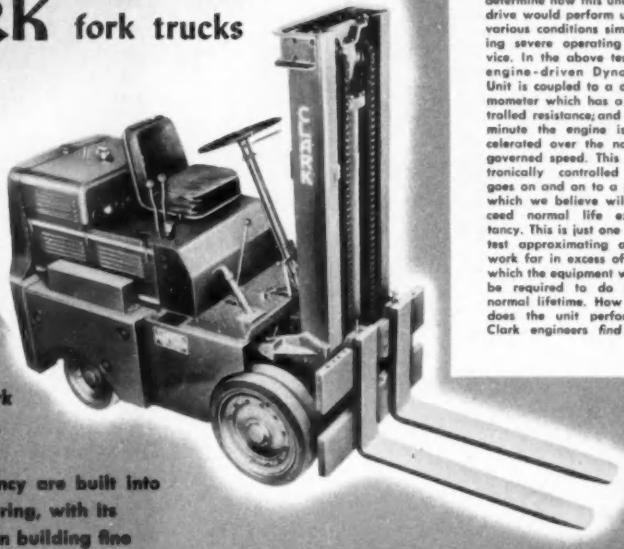
CLARK EQUIPMENT COMPANY, Buchanan, Michigan

Other Plants: BATTLE CREEK AND JACKSON, MICHIGAN



Laboratory Tests Prove CLARK fork trucks ARE THE "BEST BUY"

A VITAL STEP in developing the Dynatork Drive for Clark fork trucks was to determine how this unusual drive would perform under various conditions simulating severe operating service. In the above test an engine-driven Dynatork Unit is coupled to a dynamometer which has a controlled resistance; and each minute the engine is accelerated over the normal governed speed. This electronically controlled test goes on and on to a point which we believe will exceed normal life expectancy. This is just one more test approximating actual work far in excess of that which the equipment would be required to do in a normal lifetime. How well does the unit perform?—Clark engineers *find out.*



✓ **IN THE CLARK ENGINEERING LABORATORY—the only one of its kind in the entire field of Materials Handling—constant testing proves conclusively that *Clark* fork-lift trucks do more work at less cost and for a longer time.**

✓ **THAT EXTRA-ABILITY and efficiency are built into these machines by *Clark* Engineering, with its more than 30 years' experience in building fine power-transmission equipment for trucks, buses and tractors.**

...CONVINCING REASONS **WHY** *CLARK FORK TRUCKS ARE YOUR* **"BEST BUY."**

CLARK ELECTRIC AND GAS POWERED **FORK TRUCKS** AND INDUSTRIAL **TOWING TRACTORS**

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NEW PRODUCTION AND PLANT EQUIPMENT

For additional information please use coupon on page 54

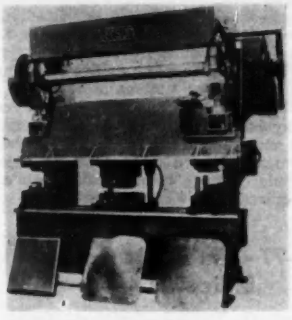
(*Continued from page* 82)

Table way bearings are automatically lubricated and cross slide and saddle bearings are equipped with one shot Biijur lubrication.

J-75—Ball Corner Forming Dies

Due to a tool-up by the Verson Allsteel Press Co., Chicago, Ill., it is now possible to form ball corners in standard press brakes at a reported saving of 30 to 50 cents per panel, with additional claimed benefits of improved product appearance, minimum spoilage, elimination of corner welding and finishing, and substantially reduced handling.

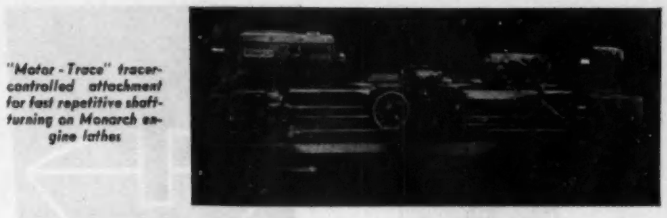
Starting with a square sheared blank, first operation is to trim developed corners (4 strokes); second operation is to draw the corners (4 strokes); third operation is to cam trim after the draw (4 strokes). These first three operations are performed in a single Verson intermediate press brake equipped with three sets of dies.



Standard Verson intermediate press brake equipped with dies for performing the first three operations on ball corners. The first die on the right trims two ball corners on a square sheared brake in four strokes. The center die draws the corner in four strokes, and the die on the left cam trims surplus material from the corners.

Fourth operation, restriking the side flanges—also requiring four strokes—is performed in a second brake equipped with a sectional restrike die. This consists of a pair of master ends and filler blocks to permit restriking any length within the capacity of the brake.

Thus, a ball corner panel is completed in only two handlings without any special machinery.



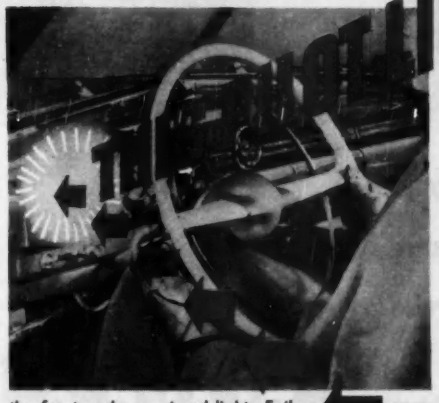
"Motor-Trace" tracer-controlled attachment for fast repetitive shaft-turning on Monarch engine lathes

J-76—Tracer Controlled Lathe Attachment

For fast repetitive shaft-turning at low cost a new tracer-controlled method known as "Monarch Motor-Trace," announced by the Monarch Machine Tool Co., Sidney, Ohio, is applicable to all Monarch engine lathes 14 in. and up, to and including the 20 in. Model M. It is a motor-powered, electrically-

As more and more reliance is placed on signal lights to indicate the intention to turn in the operation of motor vehicles, it becomes increasingly important that the driver know that his signals are working. The TUNG-SOL Flasher provides for a safety pilot light on the instrument panel, as well as a thoroughly reliable means of actuating the signal itself.

The safety pilot light does more than indicate that the switch is "on." Normally, it flashes in unison with the front and rear signal lights. Failure of the pilot light warns you that the circuit is out of order and the signal is not flashing.



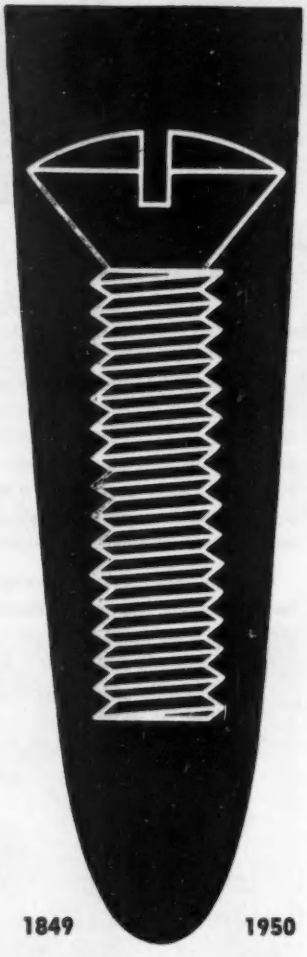
PILOT LIGHT makes direction signaling safer

Millions of TUNG-SOL Flashers have been performing faithfully for the past ten years. Ordinarily, they last for the life of the car. They start instantly, work crisply, consume little current and are unaffected by ambient temperatures. *Write for bulletin.*

TUNG-SOL Lamp Works Inc., Newark 4, N. J. Sales Offices: Atlanta, Chicago, Dallas, Denver, Detroit, Los Angeles, Newark.

TUNG-SOL *signal* FLASHERS

AUTO LAMPS • ALL-GLASS SEALED BEAM LAMPS • ELECTRON TUBES



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Please send me your new catalog containing full data on the complete line of Blake & Johnson fastenings.

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NEW PRODUCTION AND PLANT EQUIPMENT

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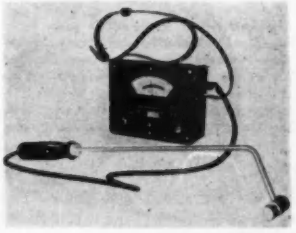
operated duplicating device which converts any new Monarch machine within these sizes into an automatic-cycle unit capable of producing small lots of two or three pieces with the economy ordinarily associated only with long production runs.

Tracing with the Motor-Trace device is from gage blocks, micrometer heads or a template in handling straight, multiple-diameter shaft-turning requirements. Also, it may be used for step-boring and step-facing; and when tracing is from a template, such work as tapers, contours, radii or chamfers may be turned.

With finger-tip control of the automatic-cycle from a single pedestal type station, one operator on most work can handle two machines with less fatigue than he would operate one manually-controlled lathe, the company reports. The Motor-Trace attachment can be disengaged in 30 seconds or less, to convert from automatic-cycle to conventional engine lathe operation.

Power for both longitudinal and cross movement is supplied by separate, electronically-controlled feed motors, which make available an infinite number of feeds within a range of ½ in. to 20 in. per minute. Rapid cross traverse and rapid longitudinal traverse left or right is 100 ipm. As many as five feeds may be present for automatic operation at the proper time in the cycle, and feed may be changed to traverse instantly as required. Feed remains practically constant despite load variation as electronic controls automatically maintain required speeds of feed motors.

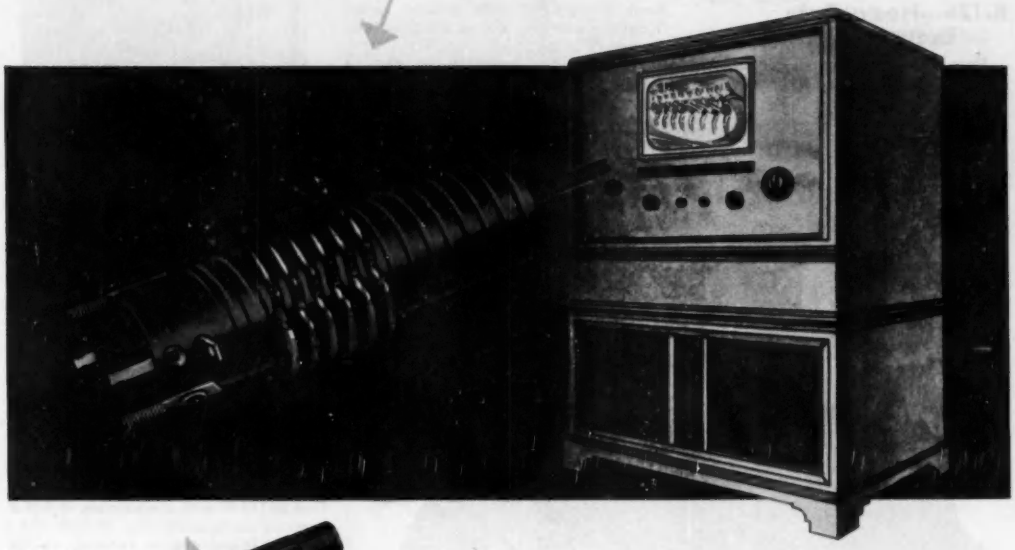
J-77—Tin Content Indicator



Portable direct-reading tin content indicator put out by the Wheelco Instruments Co., Chicago, Ill., for quick determination of ration of lead and tin content in solder. With it, lead alloys having up to 7 per cent of tin content may be tested by users of solder such as manufacturers of metal containers, in a matter of seconds, eliminating time consuming laboratory tests. Equipment includes indicator meter, shoulder strap, and light weight sensing unit.

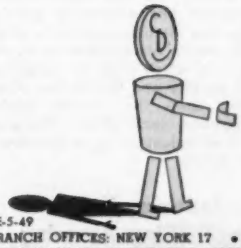
another C-D development . . .

a strong, lightweight, LOW-COST tubing for your electrical applications



Spiral Tubing—one of the many developments that have helped bring television into the mass market. Recently introduced by Continental-Diamond laboratories, it is ideal for electrical, radio, and television applications where a good dielectric tubing with high strength and lightweight is needed. It is available in a variety of sizes and grades to meet requirements for low moisture absorption, forming, riveting, drilling, tapping, etc.

It is another example of why it pays to see C-D first in your search for the right plastic. C-D Plastics provide *practical* combinations of mechanical, electrical, and chemical properties—structural strength, lightweight, moisture, heat and corrosion resistance. For fast delivery, or help with material selection problems, call your nearest C-D office, any time.



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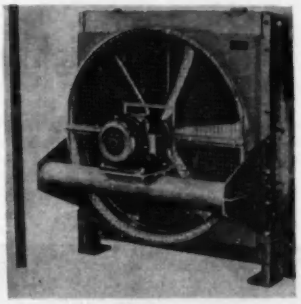
NEW PRODUCTS

For additional information regarding any of these items, please use coupons on page 54

K-126—Heavy Duty Engine Radiator

New custom designed details for jacket water cooling radiators have been incorporated into special Mono-Weld radiators by Young Radiator Co., Racine, Wis.

Basically the radiator is one of Young's line of Mono-Weld radiators, but the use of special types of metals makes the unit practically corrosion resistant under varying weather and climatic conditions. All major ferrous parts are zinc plated; nuts, bolts, screws and washers are cadmium plated. The natural corrosion resistance of copper, brass and aluminum protect the actual core and cooling parts of the unit. Additionally, a priming coat of zinc chromate has been applied, followed by a coat of gray enamel.



Young Mono-Weld heavy duty engine jacket water cooling radiator No. 79095 having Streamaire fan and shrouding equipped with guard front and rear and self closing shutters.

The radiator is designed to maintain a maximum jacket water temperature of 180 F with a maximum of 120 F ambient air temperature. It will cool a 173 hp Diesel engine running at 720 rpm driving a 100 kw generator.

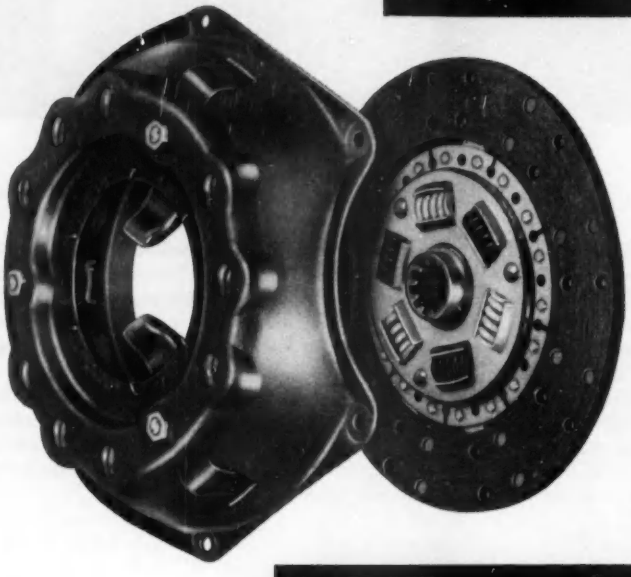
Other construction details of the Mono-Weld fabricated steel tank radiator consist of welded steel tanks, side members, and motor base supports; a copper front guard screen with 1-in. mesh, copper fan guard screen with 1-in. mesh; and aluminum fan shroud with aero-dynamically designed venturi type opening for high air delivery with minimum resistance to air flow. A cast aluminum air foil fan developes high air delivery with low power consumption. The fan is mounted on output shaft of a 5 hp, 1140 rpm motor. Aluminum shutters are automatic gravity type. The fan air blast opens the shutter blades which remain open until the fan stops, at which time the combined forces of gravity and the shutter blade unbalance, close the shutter blades tightly against each other. Radiator core is of an industrial type reinforced at strain areas.

K-127—Indexing Unit For Drilling, Reaming

An all-purpose indexing unit of horizontal type developed by Snow Mfg. Co., Bellwood, Ill., for drilling, reaming, countersinking and tapping operations, provides high production through ease of changeover, setup, loading and unloading. In multi-hole drilling opera-

(*Turn to page 92, please*)

Engineered by Borg & Beck... ...means MAXIMUM PERFORMANCE MINIMUM MAINTENANCE!



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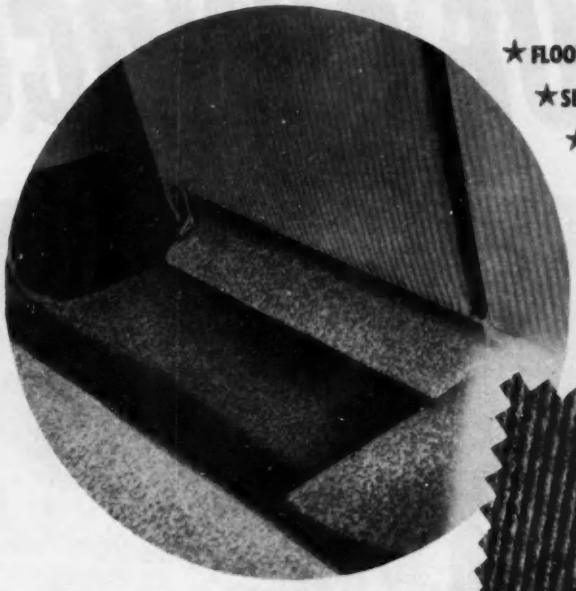

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There are many reasons why you should be interested in this long wearing, improved, low-cost trim material:

It is ATTRACTIVE, TOUGH, FLEXIBLE, EASY to CLEAN, EASY to INSTALL, and ECONOMICAL. The material can be supplied in cut parts ready for quick, easy installation.

Sound-absorbing, sound-deadening modified jute base is plastic coated to make an attractive appearing surface, easy to wash and keep clean. Resists gasoline, motor oil, alcohol and other common solvents.

Available in many combinations of colors to suit your styling requirements.

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BURLINGTON MILLS INCORPORATED

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New BLUE SUNOCO

MOTOR TUNE-UP EXPERT

"Gasoline is of prime importance in motor tune-ups." says George A. Robinson, III, of the Delray Ignition Service, Fla. "If the gas used isn't right you can't do a top-notch tune-up job. We recommend New Blue Sunoco to all our customers."

ENTHUSIASTIC USER

"I tried 10 gallons of New Blue Sunoco," says Mrs. John Ostrom of Washington, D. C., "and see no use paying premium prices any more when New Blue Sunoco gives premium performance in our Cadillac and Mercury—and at a saving."

NEW BLUE SUNOCO

OUR POLICY: ONE GRADE...ONE PRICE

SETTING SALES RECORDS

Sensational New High-test Gasoline Designed for the New High-compression Engines and Packed with New Power for All Cars...Sells at Regular Gas Price

- ✔ New High ANTI-KNOCK POWER
- ✔ New High ALL 'ROUND PERFORMANCE
- ✔ New High VALUE PER GASOLINE DOLLAR

MEMO TO:
CAR DEALERS

WHEN DEMONSTRATING your 1950 cars . . . fill them with New BLUE SUNOCO—the new high-test gasoline packed with NEW HIGH ANTI-KNOCK POWER!

MAKE SURE

your customers keep on getting top performance from the cars you sell . . . recommend sensational New BLUE SUNOCO!

NO SECOND GRADE...NO THIRD GRADE

Whatever it is
IF IT'S MADE OF
Metal

you'll FINISH it
• FASTER • CHEAPER • BETTER
with a Schmieg planned
CENTRI MERGE
FINISHING
SYSTEM

FINISHING has a highly important bearing on the sale of your product if APPEARANCE is a factor in its acceptance. Obsolete, inadequate finishing equipment improperly laid out, not only makes for inefficient finishing and consequent poor appearance—it materially adds to manufacturing cost.

Equipment for metal washing, bonderizing,* dry-off, spray painting, baking, as developed by Schmieg engineers, is planned precisely for your plant and product—coordinated into a speedy, smooth-flowing production unit that saves time—space—and operating expense. Schmieg has the years of engineering experience, knowledge of modern methods and the facilities for seeing the job through—from initial designs to completed machines, set up and ready to operate in your plant.

*Trade Mark of Parker Rust Proof Co.

Our engineers will be pleased to consult with you in the solution of your problem.

THE best AIR PURGE is CENTRI MERGE

Schmieg INDUSTRIES INC.
Engineers & Manufacturers

NEW PRODUCTS

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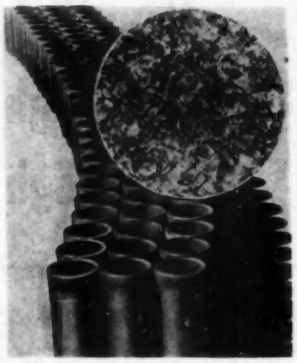
(*Continued from page* 88)

tions requiring accuracy of spacing, several of the units can be tooled to allow one operator to feed three or four machines. The operator inserts the work, starts the drilling cycle and goes on loading and unloading other machines. With a simple setup change, the units can be used in processing stamping.

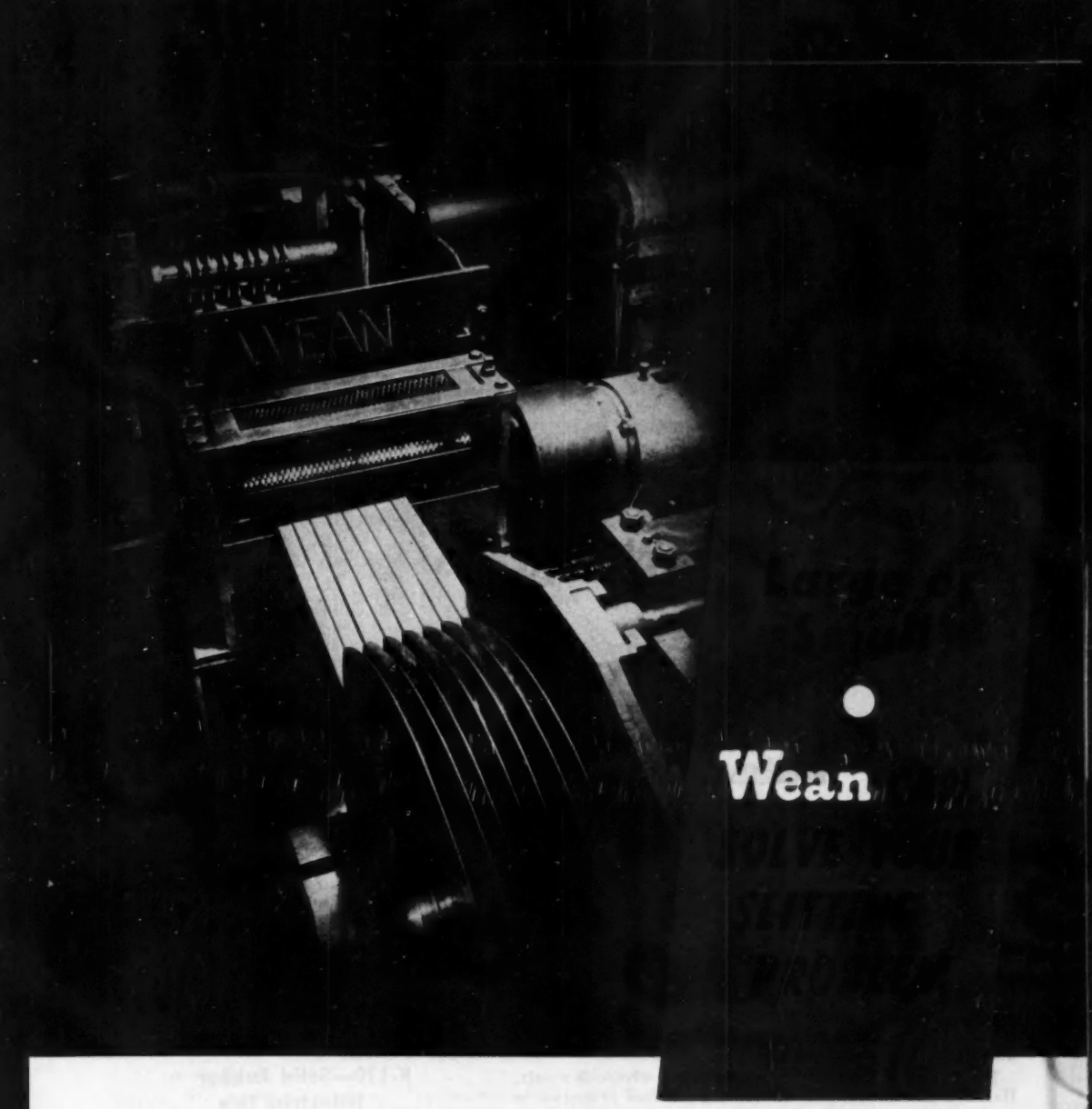
K-128—Cylinder Sleeve Castings

In volume production at Perfect Circle Corp., Hagerstown, Ind., are cylinder sleeve castings that, when machined and installed in an engine, are claimed to considerably outwear sleeves cast by conventional centrifugal methods, and to cost less than statically-cast sleeves. Perfect Circle is making only the rough castings that are machined by sleeve and engine manufacturers into cylinder sleeves; no machining is done on the castings by Perfect Circle. This new centrifugal casting process is said to combine the best features of sleeve castings made by the static casting method and those made by the conventional centrifugal casting method in which water-cooled molds are used.



The photomicrograph superimposed over a group of Perfect Circle "A-4" cylinder sleeve liners magnifies 250 times the structure of the inside surface of these sleeves. Black flakes are the graphite; gray areas are the matrix of pearlite. Sharply outlined white areas are small carbides of phosphides. The gray pearlite is evenly distributed throughout the entire structure. Free ferrite is entirely absent.

Perfect Circle's sleeve castings are



Wean

If you are in the business of handling strip steel or fabricating steel parts or products from strip steel you should give your slitting operation high consideration.

Well designed slitting lines enable you to reduce inventories, lower labor costs and eliminate expensive extras. Wean engineered slitting lines give you these important factors at lowest initial costs.

If you have a slitting problem—or merely desire a check on the efficiency of your present operation—call in Wean specialists.

Wean *Equipment Corporation*

CLEVELAND, OHIO

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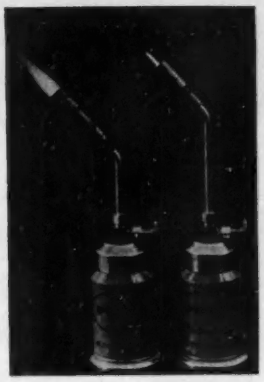
gray as cast; they require no annealing. Out-of-roundness of the castings is held to a maximum of 0.010 of an in. Castings are represented as extremely free of dirt, not porous, and not subject to shrinkage. Outer and inner diam dimensions are held to ±1/32 in.; length to ±1/64 in.

Less stock for "clean-up" need be allowed; the company points out: ⅛ in. on the outer diam, and 3/16 in. on the inner diam. Insulating coating between the casting and the mold has high refractory qualities and does not burn into the castings. There is no scale or de-carburized layer on the castings.

K-129—Self-Pressurizing Hand Torch

For maintenance and rework operations in automotive plants, a new industrial hand torch supplied with two burning tips and carrying its own self-pressurizing and self-vaporizing fuel, is offered by Pressure Products Corp., Chicago, Ill. Called the "Prepo" hand torch, it lights instantly, burns with a clean, blue hot flame, and eliminates all pouring, pumping and priming.



"Prepo" industrial hand torch of the Pressure Products Corp.

The "Prepo" fuel, a compound of petroleum hydrocarbons, is contained in a beer-sized seamless can which seals into the "Prepo" torch so that when a valve is opened, the burner lights at once with a match. Within 30 to 60 seconds the flame achieves its maximum heat of 2200 deg. When the fuel can becomes empty, it is removed, thrown away, and replaced by a new full can of the fuel.

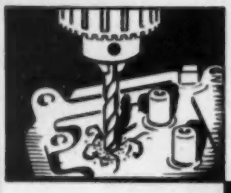
The large burning tip furnished throws a long, broad flame for work where the mechanic needs much heat quickly. The smaller tip affords a long, pin-point flame for soldering and similar work requiring heat concentrated in a small area.

Lightweight—1½ lbs—and small, this "tool box tool" is particularly adapted for intermittent use requiring instant flame.

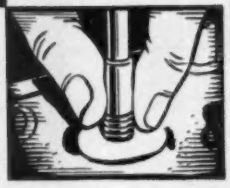
K-130—Solid Rubber Industrial Tire

A new demountable type high cushion solid rubber industrial tire for such applications as industrial trucks, and having the Innacush two compound construction, is announced by the United States Rubber Co. of Detroit, Mich. This U. S. Royal Demountable Innacush is said to provide even less mounting and demounting time than that required for a passenger car tire. Removal of a used set and mounting of a new set of tires has been accomplished in 15 minutes as compared with a time of several hours required for the usual type of pressed-on tires. A tapered hard rubber base reinforced with bead wires permits application to a tapered base wheel by bolting together the two wheel halves with a standard wrench.

(*Turn to page 96, please*)



RE-TREAD YOUR SCREW THREADS



and ELIMINATE DOWN TIME!

Stripped threads in crankcases, fuel pumps, engine blocks and other automotive components and accessories can be eliminated with Heli-Coil® Screw Thread Inserts.

Heli-Coil Inserts of stainless steel wire provide a hard, smooth, strong, non-corrosive thread protection . . . strongly resistant to abrasion, corrosion, wear, stripping, galling, and seizure.

Heli-Coil Inserts meet all S.A.E. standards . . . are made in the full range of National Coarse and Fine Thread Series . . . also in pipe thread and spark plug sizes.

For original equipment, for maintenance, salvage or repair, Heli-Coil Inserts are easily installed . . . thread protection is permanent!

Send the coupon for the Heli-Coil Design Data folder . . . no obligation, of course.

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Heli-Coil Corporation
47-23 — 35th St., Long Island City 1, N. Y.

Please send me a copy of your Design Data folder, No. 248.

NAME.....TITLE.....
COMPANY.....
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CITY.....ZONE.....STATE.....

NEW TWISTS IN RUBBER

Here, in the research and development laboratory of the new "U. S." Engineered Rubber Products Plant at Fort Wayne, the word "design" takes on a deeper, fuller meaning.

Here, given your problem involving the bonding of rubber to metal or the molding of rubber parts, U. S. Rubber engineers explore rubber "design" beyond dimensions and contours.

Will design assure the proper function of the product in service?

Will it take full advantage of the properties of the rubber compound involved—its structural strength, resilience, endurance?

Will it meet your particular operating conditions?

All these questions must be satisfactorily answered with knowledge drawn from extensive field experience, data accumulated by rubber technologists, physicists and many other scientific experts.

Then—and only then—can "U. S." engineers design rubber components so that they will exactly meet your requirements.

Finally, the rubber in the product is tested for every single quality it will be required to display in service. And the end result—"design in action"—so often demonstrates how rubber is made to do things it has never done before . . . to acquire literally new twists in the hands of "U. S." engineers.

* * * * *

"U.S." engineers invite you to work out your problem with them in their Fort Wayne Laboratory. Send for a copy of the informative booklet on this new laboratory entitled "A Treasure House of Science." Write to the address below.

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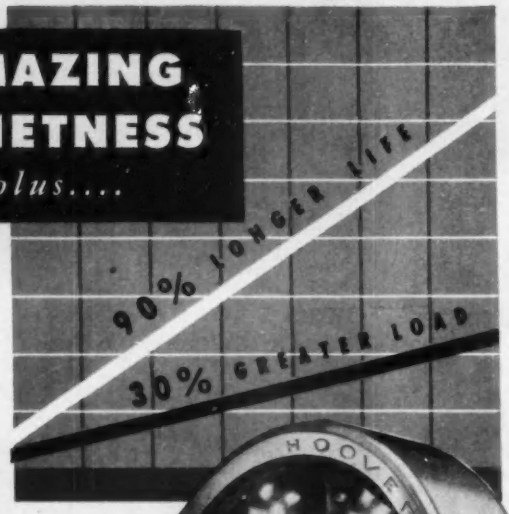
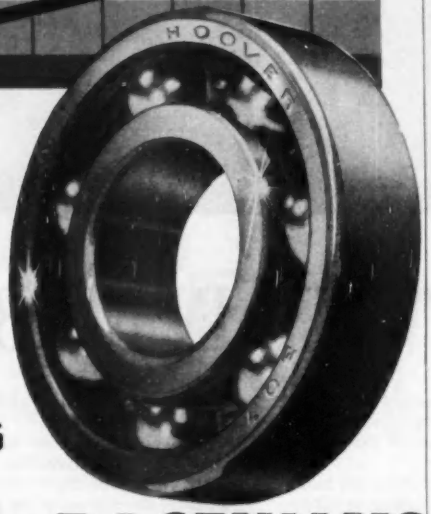
For Unexcelled Performance

AMAZING QUIETNESS *plus....*





HOOVER *the only* **BALL BEARING** *with* **HONED RACEWAYS**

Here are three pertinent reasons why you should consider Hoover Ball Bearings — with honed raceways. First, these bearings achieve unbelievable quietness. Second, they increase bearing life 90 per cent. Third they have a 30 per cent greater load capacity. When you specify Hoover Ball Bearings you secure these PLUS features without extra cost.

The Hoover Engineering Manual gives all the facts. Write for your copy.

THE ARISTOCRAT OF BEARINGS

HOOVER BALL and BEARING CO.
Ann Arbor, Michigan

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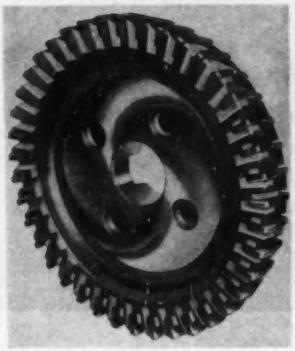
(*Continued from page* 94)

K-131—Carbide Blade Milling Cutters

Goddard & Goddard Co., Detroit, Mich., is introducing a development in



Goddard & Goddard 10 in. diam SerraTip face mill. Cutter contains 40 blades, designed for milling cast iron.

the line of carbide inserted blade milling cutters called SerraTip. It uses solid carbide inserts, permits extremely fine tooth spacing, and allows inserted blade construction in cutters as small as 1 in. in diam, and in other tools formerly requiring tips to be brazed directly to the body.

SerraTip cutter construction comprises only three component parts—body, blade, and wedge. The blade itself can be best visualized by considering it as a solid piece of carbide, across the back of which is brazed a wafer thin piece of metal. The metal backing provides a serrated surface permitting quick positive positioning, controlled adjustability, and rigid anchorage of the solid carbide inserts. This versatile design is being used in end mills, face mills, straddle mills, slotting cutters, reamers, boring tools, and other combination tools.

K-132—Air Motor and Air-Powered Feed

The Model BM2 air motor manufactured by the Bellows Co., Akron, Ohio, provides a bore of 1¾ in., develops a thrust approximately twice the applied air line pressure, and is available with either a built-in manually controlled air valve or a built-in electrically con-

11 ways to CUT Grinding Costs!

B&D Bench, Portable and Die Grinders give you MORE OUTPUT...

4 ***B&D PORTABLE GRINDERS** bring the tool to the work for grinding, cleaning, buffing, wire brushing. 3" to 6" wheel diam. Splined gear mountings, steel inserts for bearings, welded steel wheel guards.*

Per MAN Every Black & Decker grinding tool is designed to help your men work faster, with less fatigue, to cut your labor costs! B&D Portable Grinders are perfectly balanced, make it easy to bring the tool to the work. B&D Die Grinders have the lightweight so necessary for precision work. B&D Bench Grinders give more working clearance, better tool sharpening support from adjustable tool rests.

Per HOUR Famous B&D-built motors, tailor-made for the tools they drive, give these Grinders an unfailing source of power for uninterrupted production. Result: more work per hour, *every* hour!

Per TOOL Tough, longer-wearing parts give these B&D Grinders extra stamina for long years of service. Housings are extra husky to withstand hard use. B&D quality construction throughout!

WRITE TODAY for free, detailed catalog to: The Black & Decker Mfg. Co., 635 Pennsylvania Ave., Towson 4, Md.

For Expert Help in CUTTING COSTS . . . See your Black & Decker Distributor for an experienced survey of your shop. He'll show you how you can save time and money.

LEADING DISTRIBUTORS EVERYWHERE SELL

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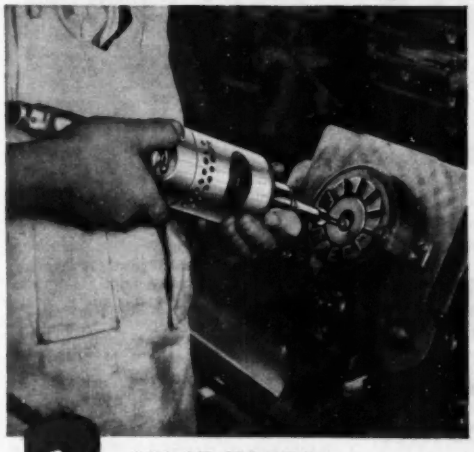
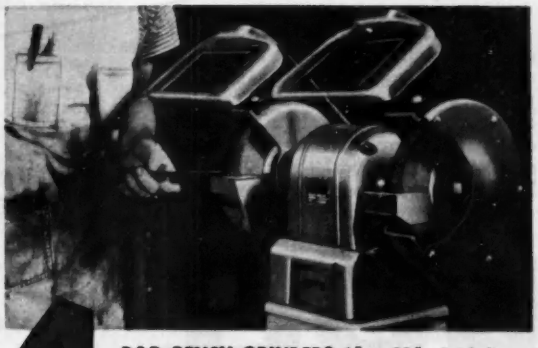
PORTABLE ELECTRIC **TOOLS**



3 ***B&D DIE GRINDERS** drive a variety of shaped wheels and burrs for high-speed precision work and grinding in hard-to-reach spots. 2", 2½", 3" wheel sizes . . . 16,000-19,000, R.P.M. spindle speeds.*



4 ***B&D BENCH GRINDERS** 6" to 10" wheel diam., for sharpening, grinding, wire brushing, buffing. Models from ¼ to 1 H.P. with powerful "constant speed" motors built by Black & Decker. Completely modern design.*

NEW PRODUCTS

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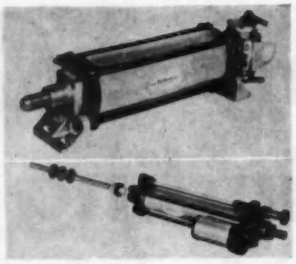
trolled air powered air valve. Speed controls for regulation of piston rod speed in either or both directions are an integral part of both valves. The air motor is available in almost any required stroke length.

The new Bellows Model HC Hydro-Check is designed to control the feeding rate of air-fed cutting tools. It applies a controlled hydraulic resistance to the piston travel of an air cylinder, smoothing out the natural bounce and springiness of air. The HC Hydro-Check provides a maximum checking load of 1200 lb, infinitely variable through a precision adjusting control. Standard models apply resistance in one direction only, permitting full control over the cutting stroke yet allowing rapid return of the tool to starting position. Double acting Hydro Checks which exert resistance in both directions are available.

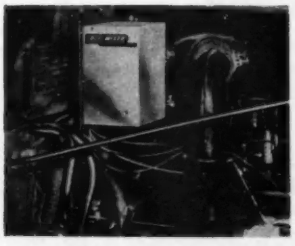


Top—Bellows BSMT air motor; bottom, HC Hydro-Check

Bellows controlled-air-power work and tool feeds have been further improved by installation of a disengaging gear which permits hand feeding. The disengaging gear is helpful in drill press applications, permitting the operator or set-up man to hand feed the spindle in setting up for production runs. Bellows air-powered feeds are equally effective in feeding milling machine tables, threading machines, tapping machines and other machine tools.

K-133—Ignition Cut-Off Switch

"Idle-Miser," a new, fully-automatic ignition cut-off switch, put out by Transportation Safety Appliances, Inc., Chicago, Ill., shuts off truck, bus, taxicab, and other vehicle engines after two minutes' idling, saving gas and reducing maintenance. It also prevents carbon monoxide poisoning which occurs when the driver sleeps while the engine is idling. A built-in tilt-switch instantly cuts the ignition if the vehicle is ditched or turned over, thus preventing fires.

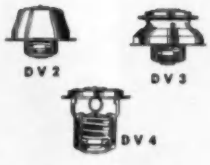


"Idle-Miser" ignition cut-off switch, offered by Transportation Safety Appliances, Inc.

The new switch goes into operation only when the accelerator is at full-off position. This permits the driver to idle the engine for warmup or other reasons, but only when he remains in the cab to step on the accelerator at intervals. The unit, factory preset, can be re-set for any idling period; can be applied to either gasoline-powered or diesel equipment; and can be furnished set to turn off all electrical equipment except running lights. Hooked into the regular ignition circuit by only three wires, the unit mounts on the engine-side of the the firewall by four screws or bolts.

(*Turn to page* 100, *please*)

The Dole DV Thermostat is designed to hold its valve at the proper degree of opening against pump pressure at any car speed, regardless of outside temperature. It maintains efficient engine operation under varying conditions and works equally well in both regular and sealed cooling systems with pressure caps.



DOLE

DV
THERMOSTATS
CONTROL WITH DOLE

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PHILADELPHIA • DETROIT • LOS ANGELES
Also Manufacturers of Copper Tubing Couplings . . . Aircraft Valves and Fittings . . . Brass Screw Machine Products

S.E.C.O. BOOSTS PRODUCTION 22%

Sunoco Emulsifying Cutting Oil Ends Rusting, Decreases Downtime, Results in Big Savings

When an emulsifying cutting oil is unable to prevent excessive rusting on machined surfaces, that's bad. But if, in addition, it has an offensive odor, that's worse . . . especially if you have to change it twice a week and thoroughly clean the machines. Three years ago a large manufacturer of electrical products sought a solution to just such a problem. It occurred in his machining of cast iron end-bearing cages for induction motors.

His search ended when a Sun representative introduced him to Sunoco Emulsifying Cutting Oil. Not only has S.E.C.O. prevented the rusting condition, but also cutting fluid changes are now spaced six weeks apart. Translated into management language, the performance of S.E.C.O. has boosted production, curtailed costs, effected savings. By sharply decreasing downtime, it has increased output 22 percent. Savings on oil and maintenance costs are amounting to almost $5,000 a year. The manufacturer is so well satisfied with Sunoco Emulsifying Cutting Oil that he uses it now in every machine which requires a soluble oil.

In all machine shop operations, on both ferrous and nonferrous metals, you'll find Sunoco Emulsifying Cutting Oil and Sunicut straight cutting oils of real assistance. They help maintain production schedules, lengthen tool life, and keep operating costs down. For a free Sun cutting oil recommendation card, write Department A1-5.

SUN OIL COMPANY • *Philadelphia 3, Pa.*

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Toronto and Montreal

SUN PETROLEUM PRODUCTS
"JOB PROVED" IN EVERY INDUSTRY

SUNOCO

MATCH YOUR GRINDING NEEDS

with Abrasive Wheels Custom-Made for You— at No More Cost...and Prompt Delivery

You Profit 4 Ways

- Better Finish
- Longer Wheel Life
- Easier Cutting
- Lower Grinding Cost

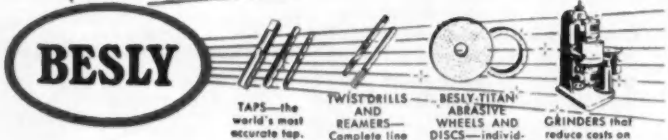
Output Doubled... First Cost Cut
Besly-Titan Resinoid Wheels used on High-Speed Swing-Frame Grinders at a large Midwestern Foundry — grinding Gray Iron and Steel Castings — doubled previous daily production, gave faster, cooler cut and *with the use of the lower priced Aluminum Oxide Wheel on both steel and iron castings*, resulted in additional saving in initial cost.

Better Work... Low Wheel Cost
At one of the country's largest tool steel mills Besly-Titan Resinoid Abrasive Wheels on Swing-Frame Grinders process Steel Billets. Removing deep cracks and pits with fewer heat checks and blemishes, they have proven superior to four competitive makes — and at a surprisingly low abrasive wheel cost of approximately $10 per day.

Wheel Life Increased One-Third
Grinding knife blades on Blanchard Machines using 30" wheels, one of the largest shops in the country— after considerable testing of many sources—had for years been using wheels of a competitive make which ran 60 hours. Besly-Titan Wheels, scientifically developed for the particular operation, are now on the job and *lasting 80 hours.*

Shop reports show that grinding wheels and discs save time and labor when they are made-for-the-specified-job . . . and they give better results.

Besly-Titan makes up abrasive wheels and discs to match *individual job specifications* . . . and you get the right abrasive — in the exact proportions — properly bonded — that will do *your* job best. What's most important—you *pay no more* than for ordinary stock wheels or discs. Deliveries are a matter of only a very few days.

See for yourself how this works out by talking over your grinding needs with a Besly-Titan field engineer. Let us show you how you can save *—and still get better work*—with Besly-Titan Wheels and Discs made especially for you. Write us for full information.

BESLY
TAPS—the world's most accurate tap.
TWIST DRILLS — AND REAMERS— Complete line for every need.
BESLY-TITAN ABRASIVE WHEELS AND DISCS—individually formulated for your job.
GRINDERS that reduce costs on every type of surface grinding.

CHARLES H. BESLY & COMPANY
118 N. CLINTON STREET, CHICAGO 6, ILLINOIS
Factory: Beloit, Wisconsin

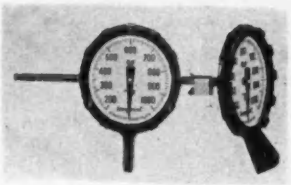
NEW PRODUCTS

For additional information please use coupon on page 54

(*Continued from page* 98)

K-134—Dial Thermometer

For indicating temperatures from 200 to 1000 F, a new Tempoint dial thermometer of the Bacharach Industrial Instrument Co., comprises a three in. diam body and a stainless steel stem, and 5½ in. free length with only 2 in. immersion required to obtain accurate readings. The bezel of the body is high temperature bakelite, having a glass window sealed with a silicon gasket to keep moisture and dust from the scale.

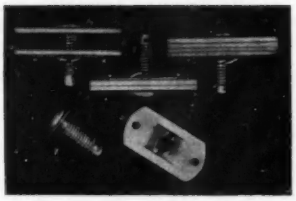


Bacharach Tempoint dial thermometer

Designed for fast, accurate thermal response, the temperature indicating element is a powerful bi-metal coil. Expansion of the coil rotates an attached small shaft and the indicating pointer as a unit, said to provide accuracy to 1 per cent of range at any point of indication.

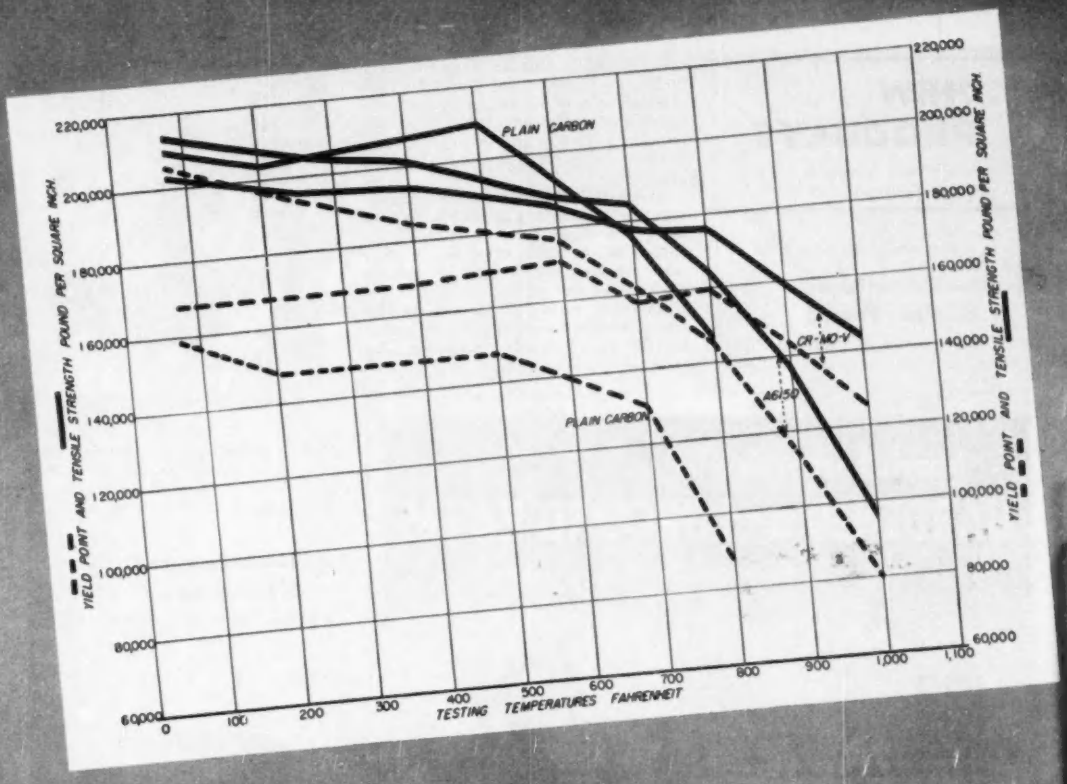
A sleeve holder provided on the stem of the thermometer permits mounting it over a hole, without tools. A handle is an integral part of the bezel.

K-135—Vibration-Proof Fastener



Vibration-proof fastener, designed not to loosen under the most severe vibration or panel movement, a product of the South Chester Corp., Phila., Pa. Called the Southco spring-grip fastener, it employs a spring as a thread. The spring acts as a shock absorber to cushion vibration and panel movement.

(*Turn to page* 102, *please*)



HIGH TEMPERATURE PROPERTIES

of Cr-V and Cr-Mo-V Spring Steels

SPRINGS FOR SERVICE at elevated temperatures require steels which resist softening and lowering of the yield point. Unless hardness and yield strength are stabilized by correct alloy additions to the steel, these properties deteriorate rapidly as the temperature is raised.

The chart above shows the yield point and tensile strength of three types of spring steel at elevated temperatures determined by standard short-time tension tests.

Springs of plain carbon steel are sometimes used at moderately elevated temperatures, although their lower yield values prevent them from giving service as satisfactory as that of the alloy spring steels.

Chromium-vanadium steel springs, such as AISI 6150, give better service at ordinary temperatures because of the higher yield point. In addition, they may be used at operating temperatures up to about 700° or 750° F because they retain high yield point values as the temperature is increased.

Chromium-molybdenum-vanadium steel was especially designed for springs operating at temperatures in excess of 750° F. It can be used for springs operating at temperatures as high as 850° F or even higher under some conditions. At 800° F, the yield point of this steel is still greater than that of plain carbon steel at room temperature.

If you have a problem in spring applications at elevated temperatures, our metallurgical engineers will be glad to help you solve it.

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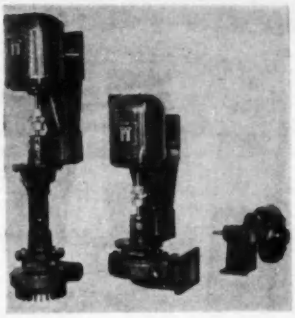
(*Continued from page* 100)

K-136—Centrifugal Coolant Pumps

A full line of centrifugal coolant pumps, all conforming to J.I.C. standards to permit the use of any NEMA motor, are products of Pioneer Pump and Mfg. Co. of Detroit, Mich. Photograph shows Pioneer method of mounting any standard motor by use of a flexible coupling and a motor-mounting bracket.

Assembly at left is a submersible type for installation inside the coolant tank. It normally rests directly on bottom of the tank or reservoir with tank brackets and flanges for mounting on edge, side or top.

Assembly in center mounts on the side of a coolant tank or machine pedestal for close-coupled installation and requires no auxiliary inlet piping.



Pioneer centrifugal coolant pumps

Assembly on right is built for various types of connections to the driving unit. It may be operated in a horizontal position as shown, or vertically.

K-137—Redesigned Flow Gage

A completely redesigned Magna-Sight flow gage put out by the Fischer & Porter Co., Hatboro, Pa., consists of a short body with flanged or screwed

Fischer & Porter Magna-Sight flow gage

pipe connections, which accommodates a fixed orifice in the lower end. A tapered metering plug rises and falls with the fluid flow rate in accordance with variable-area metering principles. The metering plug carries a permanent

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for over 40 years

SINCE the day of the duster and goggles, The Brown Corp. has meant highest quality precision parts for the automotive industry. Today, Brown Parts serve trucks, tractors, trailers, buses, axle builders, off-the-road machines and Diesel locomotives. The production methods and facilities we have developed are unexcelled — uniform product quality is assured—deliveries are reliable—service is efficient. Ask any of our long list of satisfied customers throughout the industry.

For further information about our specialized production of hardened and ground automotive and industrial parts, just drop us a note. We invite an opportunity to quote on your work.

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Stub Axle Shafts
Steering Ball Bolts
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5th-Wheel Rocker Shafts
Wheel Studs
Water Pump Shafts
. . . anything in the hardened and ground line, of any analysis steel, up to 4¼" diameter.

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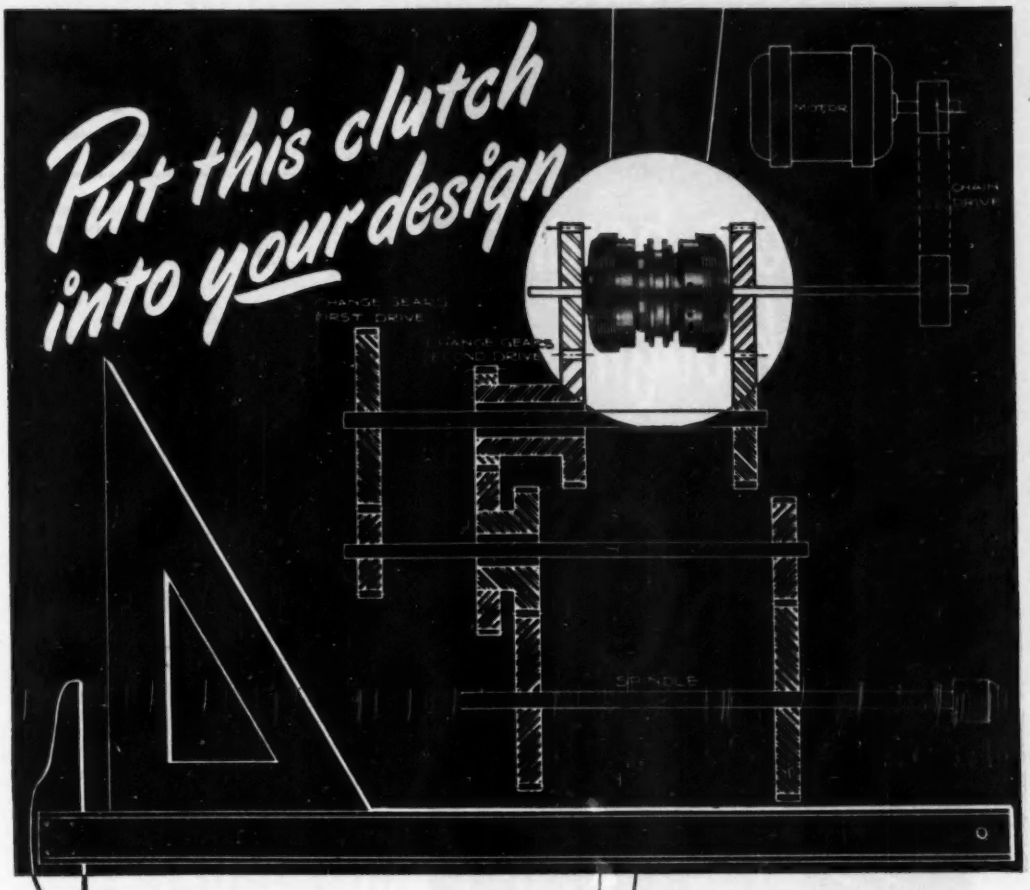
Put this clutch into your design



Twin Disc Machine Tool Clutches are engineered to fit easily into your design. They can be used as primary or cut-off clutches or as clutches that control a given function during continued operation . . . such as change-of-speed clutches where frequent operation is required.

These compact Twin Disc Clutches have exceptionally high torque capacity compared with the relatively small space required for installation. For example, a 5.5″ Twin Disc Oil-type MTS Clutch with seven driving plates has a working torque capacity of 3200 inch-pounds.

This high torque capacity is obtained through use of materials with high friction coefficient . . . ample number of friction surfaces . . . a quick and easy method of removing oil from between the friction surfaces.

Twin Disc builds both oil and dry type Machine Tool Clutches . . . single and duplex construction . . . sizes from 3″ to 12″. For complete information write for Bulletin 134-A.

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

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magnet, and a hollow, cylindrical, soft-iron follower rides in an external slot. Covering the slot is a plate on which is engraved a scale calibrated either in gallons per minute or in millimeters. The position of the follower relative to the scale indicates flow rate.

The Magna-Sight flow gage is available in brass, bronze, iron, steel and type 316 stainless steel; in sizes from ¾ in. to 4 in., and with maximum capacities from 3.5 to 250 gpm. (Minimum capacity is one-tenth of selected maximum.) The flow gage can be used for clear and opaque liquids, slurries and other fluids. Accuracy averages about 5 per cent over the scale range. Temperatures up to 400 F and pressures up to 500 psig can be accommodated.

K-138—Black Oxide Bath

For black oxide finishing of iron and steel the Heatbath Corp. of Springfield, Mass., is placing on the market their new Controlled Oxidation Pentrate. It is a two-component product in contrast to others that are either a fused or granular mixture consisting of all ingredients in one package.

The one package contains a granular mixture labeled Pentrate SS which is used in making up the original bath and also serves to replenish dragout losses. The second package contains compressed briquettes called Pentrate Brix, a new combination of oxidizers, activators and inhibitors. Brix are used in very small amounts to maintain a constant bath strength.

The oxidizing power of the black oxide bath can be controlled and it operates between 265 F and 315 F. Deep jet black colors are imparted to steel very rapidly. The process can be operated in single or double baths.

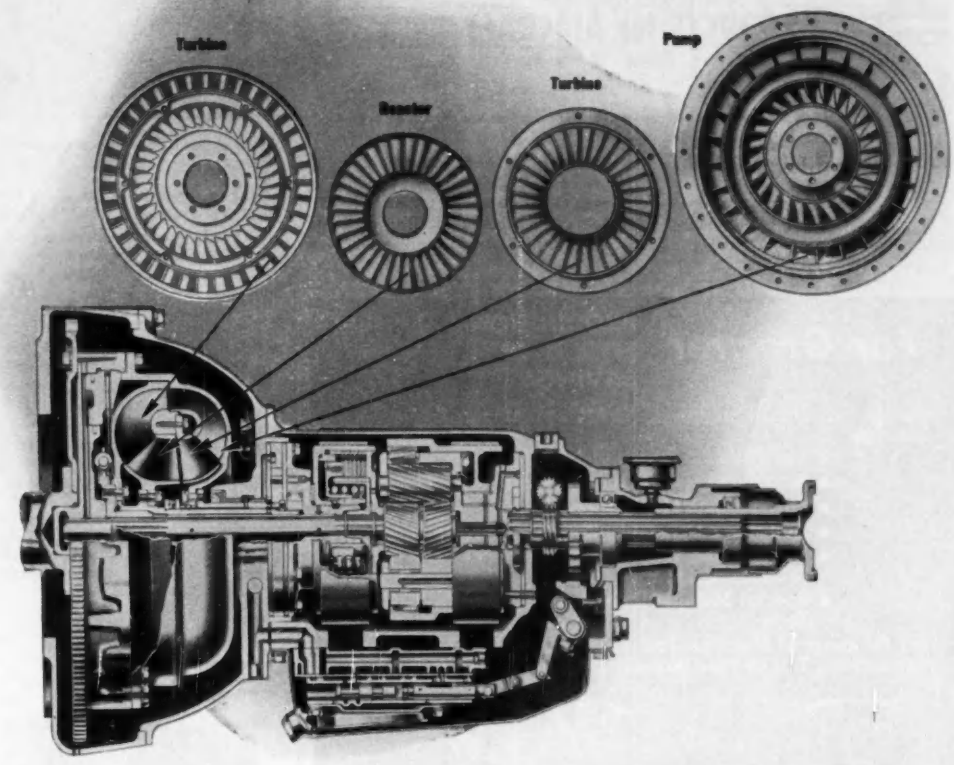
Cost of operation is declared very low in comparison with present practices. Many of the objectionable red and brown smuts usually encountered can be eliminated due to inhibitors and activators in the briquettes.

K-139—Vibration Isolator

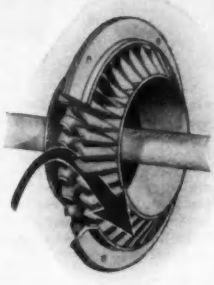
A low-cost vibration isolator for mounting pumps, compressors, fans, engine-generator sets, etc., is available from the Korfund Co., Long Island City, New York. Designed primarily for original equipment manufacturers, its heavy duty construction makes the

(*Turn to page* 108, *please*)

at the heart of Packard's *UltramaticDrive*



...ALUMINUM CASTINGS BY ALCOA



Outstanding success of the new *Ultramatic Drive* confirms Packard engineers' choice of Alcoa Aluminum Castings for vital torque converter parts. Their designs called for light weight, high strength, fast heat transfer, machinability. Plus uniform, intricate contours. Alcoa Castings fill the bill all the way.

Whether your problem is torque converters or brake parts, pistons or cylinder heads, a talk with our engineers may save you both time and money. Call your nearby Alcoa Sales Office. Or write ALUMINUM COMPANY OF AMERICA, 1841E Gulf Building, Pittsburgh 19, Pennsylvania.

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NEW PRODUCTS for AIRCRAFT

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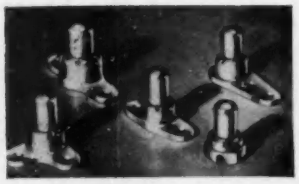
T-16—Extra High Cap Nuts

To meet demand of airframe and component manufacturers, Elastic Stop Nut Corp. of America, Union, N. J., is providing a new, extra high, light weight, all-metal cap for certain ESNA hex and anchor nuts. The cap height on the new type K3 cap nuts is sufficient to insure full clearance for AN-3 and AN-4 bolts or AN-509 screws.



ESNA Self-locking, high cap nuts, type K3.

The self-locking cap nuts, with their extra height and deep screw-thread penetration, are designed to offer greater flexibility for production line use. With them, a single screw length may be specified to join sections having permissible thickness variations equal to the extra height of the ESNA K3 cap nut, thus simplifing purchasing and assembly call-outs.

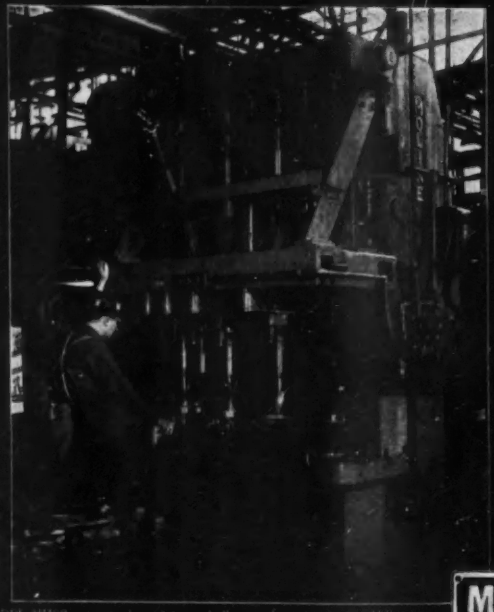
The characteristic ESNA red elastic collar and the new cap also form a pressure seal against external or internal liquid and gas pressures of 80 psi minimum, without leakage. Reuseability of the elastic collar is said to afford dependable protection against vibration, to create no damage to bolt threads, and to maintain exact adjustments, even after repeated re-use.

For Greater PRODUCTION EFFICIENCY SAVINGS

use an individually designed "Hole-Hog" Machine Tool for such jobs as:

- Multi-Spindle Boring
- Single and Multi-Spindle Honing
- Straight Line Multi-Drilling
- Adjustable Spindle Drilling
- Vertical and Way-Type Fixed Center Drilling, Boring and Tapping
- Special Multiple Operation Machine Tools

Our 50 years of Machine Tool Engineering experience is at your service. Tell us your particular problem.

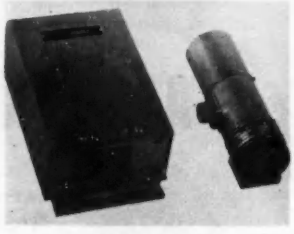


MODEL HUSH universal joint type driller performing core drilling, reaming and facing operation on forged steel parts

MOLINE TOOL COMPANY
100 20th Street Moline, Illinois

MOLINE TOOL CO. MOLINE, ILLINOIS

T-17—Aircraft Control



Overtravel is eliminated in high speed remote positioning throttles or jet after-burner valves by the new aircraft control produced by Barber-Colman Co., Rockford, Ill. Designed for speeds up to 90 deg per second the actuator rapidly approaches the desired setting and then finds the exact position. System consists of a control cabinet and actuator designed to meet all applicable AN requirements.

T-18—Aluminum Surface Polish

Stratoglo, a new aluminum surface polish for aircraft, announced by Fine Organics, Inc., New York, N. Y., is designed to meet Navy Specification P-69a performance. A homogenous liquid in which polishing solids are fully suspended, it may be applied manually or by mechanical buffing

(*Turn to page* 110, *please*)

Manufacturers like these specify FRAM

These leading manufacturers use filters embodying the Fram Oil Filtration Principle on some or all of their engines as standard equipment . . .

Allis-Chalmers Mfg. Co.
American LaFrance Foamite Corp.
B. F. Avery & Sons Company
Brockway Motor Company
Buda Company
Continental Motors Corp.
Clark Equipment Company
Crosley Motors, Inc.
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Chicago Pneumatic Co.
Continental Aviation & Engineering Corp.
Dearborn Motors Corp.
DeLaval Separator Co.
Detroit Tractor Co.
Diamond T Motor Car Co.
Divco Corp.
Euclid Road Machinery Co.
Fate-Root-Heath Co.
Federal Machine & Welder Div.
Harry Ferguson, Inc.
Ford Motor Co.
Four Wheel Drive Co.
General Motors Truck & Coach Div.
Hercules Motors Corp.
Hill Diesel Engine Co.
Hobart Bros. Co.
Frank G. Hough Co.
Hudson Motor Car Co.
Hyster Company
Insley Mfg. Co.
International Diesel Electric Co.
Kaiser-Frazer Corp.
Kermath Mfg. Co.
Landis Tool Co.
Lathrop Engine Works
Leader Tractor Co.
Lincoln Electric Co.
Lincoln-Mercury Div. of Ford
Mack Mfg. Co.
McKay Machine Co.
Meriam Instrument Co.
National Supply Co.
Nordberg Mfg. Co.
Oliver Corp.
D. W. Onan & Sons
Owens Yacht Co.
Potter & Johnston Machine Co.
Reo Motors
Schramm, Inc.
Scripps Motors, Inc.
Seagrave Corp.
R. H. Sheppard Co., Inc.
Star Marine Engine Works
Studebaker Corp.
Tropic-Aire, Inc.
Universal Motors Corp.
Waukesha Motor Co.
Willys-Overland Motors
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Test FRAM . . . write, wire or phone for complete details about Fram Original Equipment Filters. You'll find that Fram's reputation for quality is earned by filters of unexcelled efficiency . . . backed by Fram's modern engineering and research facilities . . . backed by the industry's broadest unconditional guarantee.

FRAM CORPORATION, Providence 16, R. I.
In Canada: J. C. Adams Co., Ltd., Toronto, Ont.

For Complete Engine Protection

FRAM

OIL - AIR - FUEL

FILTERS

RUBATEX GASKETS

provide these advantages in auto light assemblies

ELIMINATE BREAKING OF GLASS LENSES

PREVENT CRAZING OF PLASTIC LENSES

PROVIDE POSITIVE WEATHER SEAL

ELIMINATE COST OF MOLDED-ON SKIN

RUBATEX has helped reduce production costs for one of the country's leading auto accessory manufacturers.

The results obtained are characteristic of RUBATEX Closed-Cell Rubber. It is non-porous and will not absorb moisture even at cut edges. Inert nitrogen, retained under pressure within the sealed cells, gives RUBATEX permanent resiliency. If you have gasketing, cushioning, or sealing problems, it will pay you well to investigate the possibilities of using RUBATEX Closed-Cell Rubber. RUBATEX is available in natural and synthetic stocks in soft, medium and firm forms. RUBATEX DIVISION has a wealth of design and engineering experience which may be of value to you. For further information write for Catalog RBS-12-49. Great American Industries, Inc., RUBATEX DIVISION, BEDFORD, VIRGINIA.

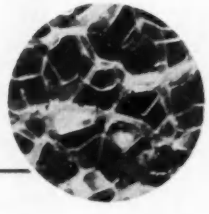

Photo-micrograph shows how each cell is completely sealed by a wall of rubber. The material cannot absorb moisture. It has high insulating values, is highly resistant to oxidation and is rot and vermin proof.

RUBATEX® **CLOSED CELL RUBBER**

NEW PRODUCTS

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(*Continued from page* 104)

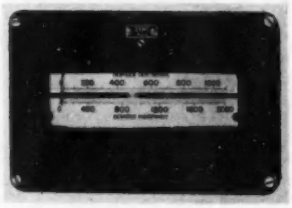
isolator suitable where conditions are severe, as in marine or mobile applications.

Steel springs provide high isolation efficiency. Housings are malleable castings, sealed by a cylindrical cork ring,

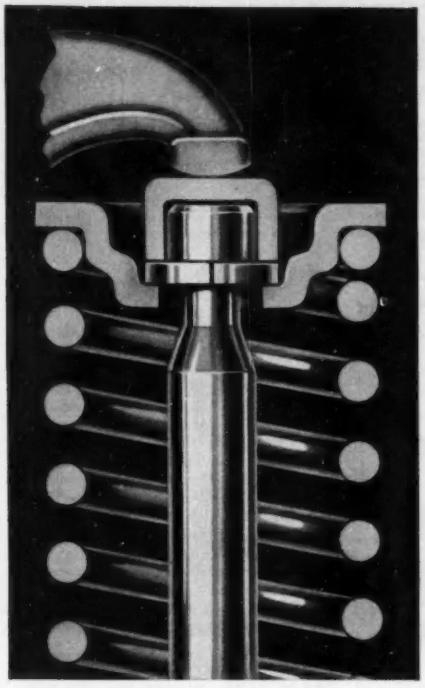
Korfund vibration isolator, type F

which snubs horizontal thrust and prevents all metal-to-metal contact. Vertical thrust control and sound insulation are also provided. Called the Korfund Type F vibro isolator, it is furnished with standard spring capacities for loads from 10 lbs to 500 lbs per isolator.

K-140—Indicating Pyrometer



Compact indicating pyrometer, Model 192 for flush and surface mounting, released by the Wheelco Instrument Co., Chicago, Ill. Instrument provides high resistance "edgewise" movement with Alnico V magnet, and wide open mirrored scale fully compensated and enclosed in a dustproof housing. For use by manufacturers of smaller type heating equipment, such as laboratory furnaces, etc., as a standard built-in accessory, it provides front dimensions of 7½ in. wide and 5 in. high.



EATON Free-Valves

Eliminate the Principal Causes of Valve Failure

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Maintain Performance at New-Engine Level

—

Lengthen Valve Life

In general, valve failures are traceable to valve stem deposits and uneven seat deposits. When the valve is free, these conditions are largely eliminated. Stem deposits cannot build up; seat deposits are reduced and kept uniform. No one part of the valve head is subjected to excessive temperature for sufficient time to cause failure.

The Eaton Free-Valve is composed of a special spring seat washer, a valve stem cap, a pair of half-circle keys, and a special valve stem shape. During the lift cycle, valve motion is controlled, but not locked so as to prevent movement between the stem and guide. This freedom permits the valve to take variable positions in operation. It has a self-cleaning effect which, in millions of miles of service, has proven its ability to eliminate valve failures between major overhauls and to maintain fuel consumption and power output at approximately new-engine level.

Eaton Free-Valves can be designed into any motor vehicle engine.

EATON

EATON MANUFACTURING COMPANY
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VALVE DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

EATON PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

New AIRCRAFT PRODUCTS

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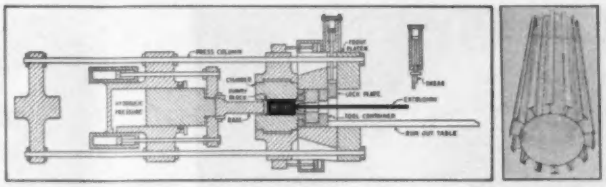
(*Continued from page* 106)

equipment, said to afford easy application or removal. The polish leaves a natural, bright finish to the surfaces; is available in 1, 5 and 30 gallon containers.



Schematic illustration of extrusion press for producing integrally stiffened aircraft skin. A hydraulically operated ram pushes hot aluminum through a die opening of the desired cross section to produce T-ribbed pipe shown at right.

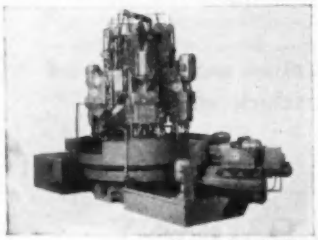
T-19—Integrally Stiffened Extruded Aircraft Skin

An aluminum extruded integrally stiffened skin promising greatly improved aircraft construction and the process by which it is produced have been unveiled by the Reynolds Metals Co., Louisville, Ky. By the process huge presses extrude aluminum alloy sheet in the form of large diameter pipe having the integral outside skin of the pipe in the form of reinforcing T-shaped ribs. The pipe when cooled is then split lengthwise and opened into flat sheet form, the rows of reinforcing Ts a solid integral part of the sheet. The process affords a startling improvement in airplane skin structure because it is said to point to elimination of much—if not eventually all—of the riveting necessary in airframe manufacture.

This integrally stiffened skin structure in which the skin and skin stiffening elements are made one part is expected to overcome structural weaknesses now handicapping flight above the speed of sound. It points to building of military aircraft wings and probably fuselages devoid of internal spar bracings. By obviating conventional costly methods of riveting stiffeners to the skin in wing compression panels it reduces the number of parts and attachments, handling, and tooling. Besides reducing weight and greatly increasing surface smoothness which is rivetless the new method is additionally said to permit production of the most complex cross sections.

Help Maintain Production of 166 Pieces Per Hour — Lower Maintenance Costs

When you need high production with low unit and maintenance costs, consider the advantages of Roto-Matics. In this case the Roto-Matic is a station-type machine with indexing table. Drilling and reaming both suspension and king pin holes in front suspension support arms are performed at the rate of 83 pairs or 166 pieces per hour



General view of drilling and reaming machine equipped with new Roto-Matic mechanical power heads.

An outstanding new Davis and Thompson development incorporated in the design of this machine are the Roto-Matic mechanical, electrical power heads operated by screw feeds. Included among the safety features are overload release clutches on the feed screws. Six heads are used, three vertical and three horizontal. Lower maintenance costs are obtained through elimination of excessive servicing.

Machines similar to this can be designed to handle dissimilar operations in the same parts or one operation on continuous production. Investigate the profitable applications of Roto-Matics.

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will be furnished upon request. Write today. Ask for bulletin A-1

DAVIS and Roto-Matic THOMPSON

Davis & Thompson Company
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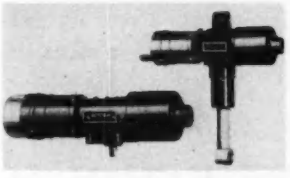
T-20—Rotary and Linear Actuators



Industrial model "Rotorac" and "Lineator," electric rotary and linear actuators, placed on the market by Airborne Accessories Corp., Hillside, N. J. Recently modified for operation on 110 volt, 60 cycle, single phase A.C. in addition to the low voltage D.C. for which they were originally designed, this change now eliminates need for a rectifier.

(*Turn to page* 112, *please*)

They Actually Cut

THEIR OWN THREADS!

TYPE 1 for Metals

Exclusive slot of Shakeproof Thread-Cutting Screws eliminates costly separate tapping—you save one entire operation.

TYPE 23 for Die Castings

Because each screw cuts its own mating thread, tighter, stronger fastenings are assured. The wide thread-cutting slot assures free cutting in softer metals.

TYPE 25 for Plastics

Eliminate special threaded inserts! Spaced threads provide high resistance to stripping and minimize chipping or breaking out in brittle materials.

SHAKEPROOF

T. M. REG. U. S. PAT. OFF.

THREAD-CUTTING SCREWS

just drill and drive—that's all!

SCREW ASSEMBLY IS FASTER WITH THE NEW SHAKEPROOF POWER SCREW DRIVER

Automatic hopper feeding of any head style screw in a broad size range speeds production. Handles Shakeproof Thread-Cutting Screws and Sems units as well as ordinary screws. Proper tightening torque for maximum fastening efficiency assured. Write today for details!

Send

FOR THIS FREE BOOKLET TODAY!

See how Shakeproof Thread-Cutting Screws will reduce costs on your own production line. Specifications, engineering data and ordering information included.

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Let a Shakeproof engineer study your product to see if improved fastening methods can reduce your costs. Write for details, today!

D. A. STUART'S

ThredKut

REDUCES COST OF MACHINING SPINDLE GEARS BY 50%

ROTATING barbed spindles in the International Harvester cotton picker are the mechanical "fingers" which pluck cotton in modern fields.

In cutting SAE 8640 gears for these spindles on Gleason Revacycles, a dilution of Stuart's THREDKUT 99 reduced oil costs by 50%.

On the spindle broaching operation, done prior to barbing, this same Stuart product is performing with excellent results. The spindles are C1117 steel, hardness 83 on the Rockwell B scale.

On standard or special operations you will find that Stuart cutting fluids plus Stuart service are the combination that will reduce your costs. Ask for literature.

our 85th Anniversary Year!

D.A. Stuart Oil Co. EST. 1865 LIMITED

2733 South Troy Street, Chicago 23, Illinois

New AIRCRAFT PRODUCTS

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(*Continued from page* 110)

T-21—Rotary Actuator

"Trim Trol" electric rotary actuator for low voltage D.C. or 110 volt, A.C., completely redesigned by Airborne Accessories Corp., Hillside, N. J., in a more compact unit weighing 2¼ lbs. Standard gear ratio produces 350 in.-lbs. operating torque through 180 deg. maximum rotation. Static capacity exceeds 1500 in.-lbs. Unit incorporates zero backlash output, magnetic brake, built in externally adjustable limit switches and potentiometer and radio noise filter.

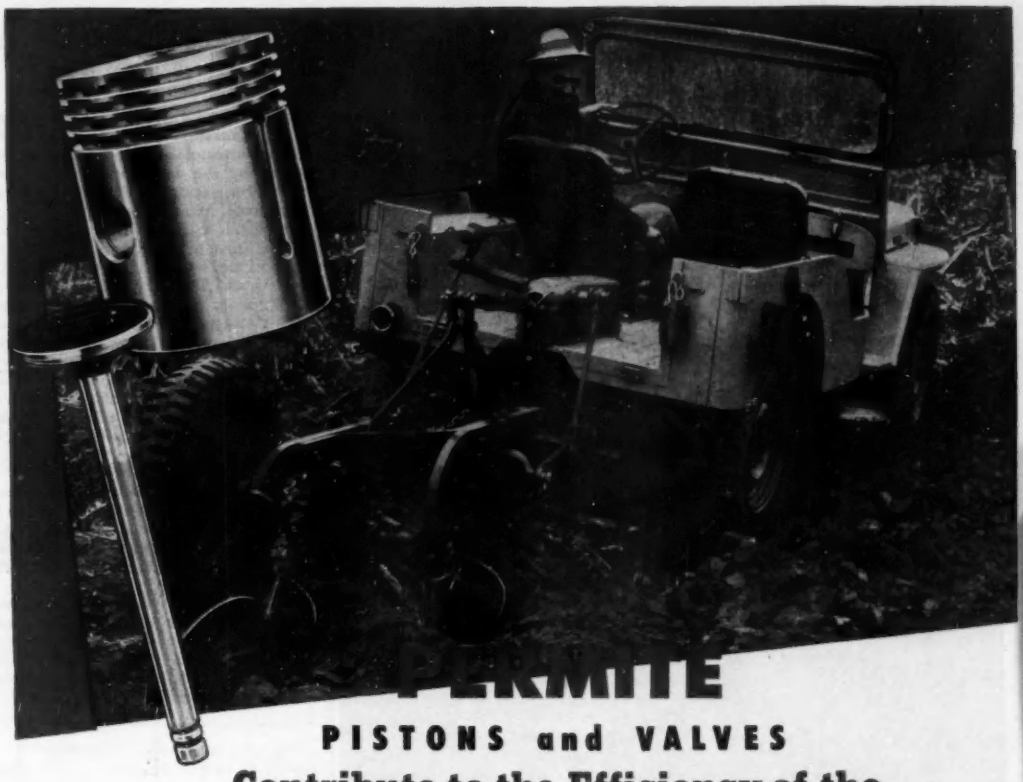
Packard Ultramatic

(*Continued from page* 48)

thorough oil drainage. At the exit end, transmissions take one or two courses. Accepted units are picked off at the bend of the exit end of the conveyor at the right and placed on a platform conveyor line for assembly of the oilpan. The start of this line will be found right at the bend of the oil drain conveyor. Rejected units on the other hand, remain on the conveyor and move to the left where they are picked off and routed for repair in the repair department located in the extreme upper left hand corner of the diagram.

Here trained operators are prepared to diagnose the cause for rejection and make the necessary repairs or replacements, and adjustments. Upon completion of this operation the units are returned on the return loop of the conveyor to the air hoist station on the assembly line for another trip to the test stand and oil drain.

In addition to the stock transfer conveyor mentioned at the outset, there is a separate materials handling conveyor line which transports the various gears from the manufacturing department to assembly. This conveyor starts its course at the extreme right hand corner at the lower end, carries gears through the gear testing department at the extreme right of the diagram. Matched gear sets are then mounted on the conconveyor for transport to the left where the conveyor may be seen skirting the sub-assembly stations beginning in the region of station four of the assembly conveyor.



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Universal 'Jeep'

BY its exceptional ability to handle all types of pulling and hauling jobs, and to power innumerable kinds of labor-saving farm and industrial equipment, the Universal 'Jeep' is proving to be a big money maker for its owners on increasing thousands of farms and ranches everywhere.

Unmatched in its sturdy construction and ability to pull through mud or sand or over ice and snow, the 'Jeep' stands up to the rugged service encountered in daily farm use.

We at Permite are proud that Permite Aluminum Pistons and Permite Exhaust and Intake Valves are used as original equipment in the highly efficient engine which powers the 'Jeep'. Made to precision standards in the modern Permite plant, under strict laboratory control, Permite Pistons and Valves have the rugged dependability of 'Jeep' performance.

In the 'Jeep' as in many other leading makes of automotive vehicles, Permite Parts are helping maintain today's high level of engine efficiency.

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ALUMINUM PERMANENT MOLD, SAND and DIE CASTINGS...HARDENED, GROUND and FORGED STEEL PARTS

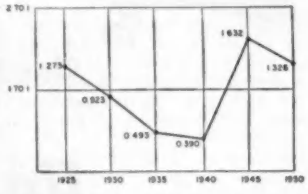
Large Attendance at Machine Tool Forum

With an upswing in business reported for the machine tool and electrical equipment industries, this news contributed to the success of the Fourteenth Annual Machine Tool Electrification Forum sponsored last month at Buffalo by the Westinghouse Electric Corp. Approximately 115 companies and two Government agencies were represented at the meeting, which featured technical sessions, panel and forum discussions, and a plant inspection trip. Attendance was near the 300 mark.

An important panel discussion was devoted to the proposed revision of the American machine tool electrical standards, the result of joint conferences with the Electrical Committee of the National Machine Tool Builders Association, representatives of the National Electrical Manufacturers Association, and representatives of large users of machine tools, primarily those of the automobile companies as represented by the Joint Industry Conference. Discussion on the JIC specifications was handled by E. L. Bailey, Chrysler; W. B. Nichol, General Motors, and R. W. Korwitz of Ford.

Speaking on the subject, "What to Do About This Equipment Crisis," L. W. Scott Alter, president and general manager of the American Tool Works Co., warned that "if the present trend of the inadequate replacement of old machine tools is not reversed, by 1955 more than three out of every four machine tools in this country will be at least 10 years old." He submitted a current equipment ratio chart, which is reproduced here, to show the trend in machine tool inventory and that the downward slope of the curve today reveals an unfavorable situation with 133 machines less than 10 years old for every 100 machines over 10 years old.

The increasing electrical requirements of machine tools was analyzed by E. K. Morgan, electrical engineer of the Giddings & Lewis Machine Tool Co. He concluded that physical limits



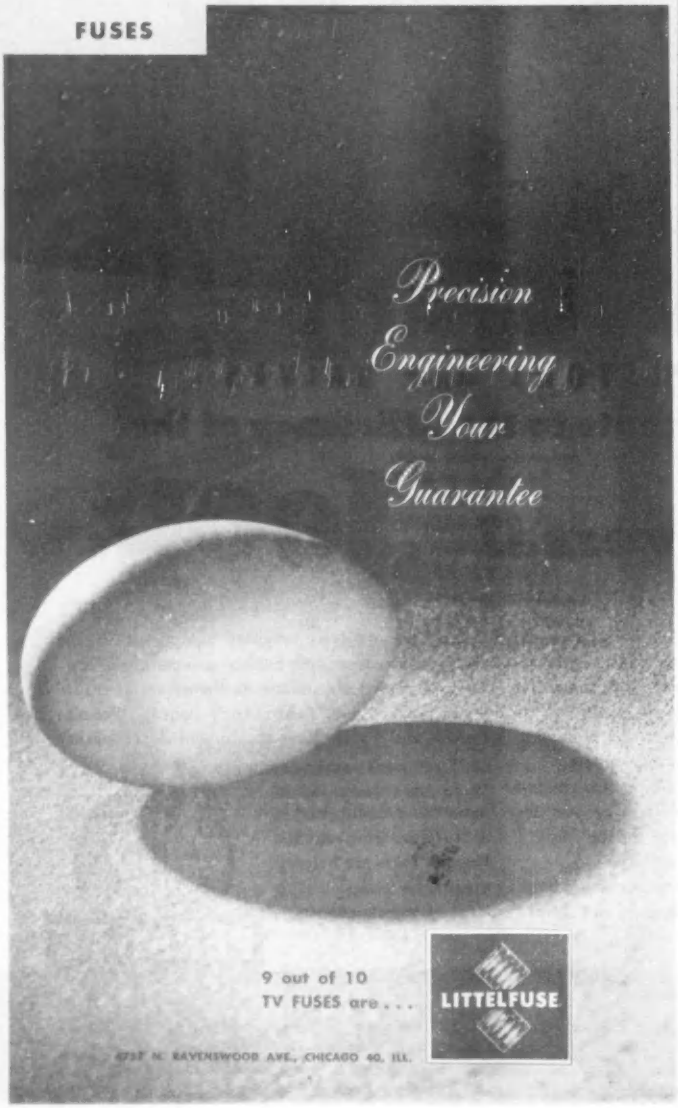
This chart from the Scott paper, "What to Do About This Equipment Crisis," gives the ratios at five-year intervals of the relation of all machines less than 10 years old to all machines more than 10 years old in American industry.

have been reached in applying motors of present design to machines to meet the demand for added horsepower for efficient use of carbide tools and that there is a real need for greater horsepower, smaller motors, more dependable operation, all at less cost.

In his paper R. H. Schuman, engineer of the Warner & Swasey Co., described the operation and controls of the W & S single-spindle automatic chucking machine, which was developed to reduce set-up time. How electronic devices are being used to improve machine tool control to provide easier operation, higher accuracy, higher production, at lower cost, was presented by J. M. Morgan, Jr., electrical engineer of the Cincinnati Milling Machine Co.

After an investigation of the me-

(*Turn to page* 116, *please*)



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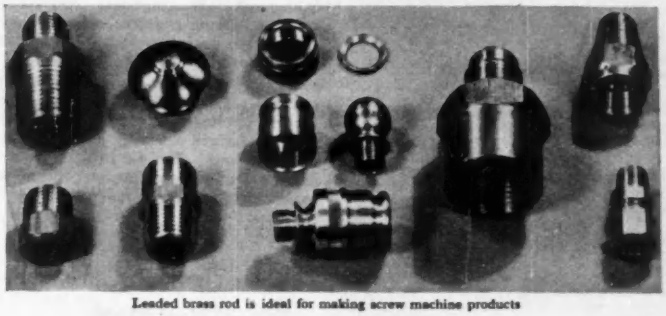
COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by BRIDGEPORT BRASS COMPANY "Bridgeport" BRASS CO. *Headquarters for BRASS, BRONZE and COPPER*



Leaded brass rod is ideal for making screw machine products

Speeding Up Machining Operations

The addition of varying amounts of lead to brass, bronze and nickel silver will quickly speed up machining operations involving the removal of excess metal by turning, milling, drilling, tapping, etc.

Lead does not dissolve in copper-base alloys. It is found as tiny particles or spheroids of free lead scattered throughout the metal.

Lead Breaks Up Chips

Even a small amount of lead has a pronounced effect on the character of the chips. Without lead, most copper-base alloys generate curly, stringy chips which cling to the tool and work and tend to clog the machine. Since lead breaks the continuity of the matrix, it causes chips to break apart more easily. In amounts over 2%, the chips crumble and resemble sawdust. It reduces the hot workability of metals—not so much with Muntz (60% copper and 40% zinc) but higher copper content alloys.

Lead also cuts down cold workability in proportion to the amount present. Where a compromise between much ductility plus some machinability is required, small amounts of lead from 0.15 to 0.50% are added.

Leaded Rod in Stock

Ledrite free machining brass rod, which contains about 61% copper, 3.5% lead and remainder zinc, is considered the easiest machining of all the copper-base alloys. Since it has a machinability rating of 100%, the alloy is used as a standard to compare machinability of other metals.

Ledrite free-cutting brass rod meets about 90% of all requirements for screw machine operation. Large stocks in a variety of sizes and shapes are carried at the mill and by district warehouses for immediate deliveries.

Fabricator and Laboratory Must Work Together

Operations which call for machining plus some cold working such as knurling, forming, expanding or roll threading may require Ledrite 2 with 1.8% lead which has a machinability rating of about 90%.

Today, close contact between the fabricator and the laboratory is more necessary than ever. Mass production with low unit cost depends largely upon the use of metal with "made-to-order" properties designed for the job in question. Call on us for help on all your metal problems to reduce costs or improve your product.

Bridgeport Warehouse Service

Are you making adequate use of Bridgeport Warehouse Service?

Large stocks of brass and copper mill products carried in Bridgeport warehouses at Chicago, Cleveland, St. Louis, Minneapolis, Newark, Providence, Houston, Denver, Los Angeles and San Francisco complement the mills at Bridgeport, Conn., and Indianapolis.

Here are six ways that our warehouse service can help you:

1. *Emergency Shortages*—Whenever additional metal is needed to finish a job it can be picked up quickly without interrupting production.

2. *Rush Orders*—Use warehouse stocks as a fill-in while waiting for mill shipments.

3. *Short Runs*—Metal should be obtained from warehouses instead of waiting for mill to make up small lots to order.

4. *New Products and Trial Runs*—Buy as much or as little as you require until experimental stage is completed.

5. *Slitting Service*—Should be used for converting any stock you may have on your shelves to usable widths. This also makes Bridgeport warehouse stocks more flexible.

6. *Cautious Buying*—Warehouse stocks should be used for hand-to-mouth purchasing.

Bridgeport's Warehouse Stocklist will be mailed upon request. This booklet also contains a valuable technical digest on the properties of most commonly used copper-base alloys.

BRASS • BRONZE • COPPER • DURONZE — STRIP • ROD • WIRE • TUBING

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COMPLETE MACHINES—"Hy-Power" work units are easy to apply and use in machines of your own design or construction. Hannifin also offers a complete line of standard and specially designed units to meet users particular requirements.

"HY-POWER HYDRAULICS" now makes it practical for tool makers, machine builders, and design engineers to employ hydraulic pressures up to 5,000 p.s.i. under finger-tip control to solve innumerable manufacturing problems more efficiently and economically than ever before possible.

"HY-POWER HYDRAULICS" with its fast, automatic operating cycle offers manufacturing plants, large and small alike, almost unbelievable opportunities to reduce unit costs, save time, and improve the quality of work produced on a wide variety of riveting, punching, pressing, shearing, multiple punching, and multiple riveting operations.

For the complete story of "HY-POWER HYDRAULICS," see your local Hannifin representative or send for a copy of new Bulletin No. 150. "HY-POWER HYDRAULICS" is a remarkable engineering development pioneered by Hannifin. *Find out what it can do for YOU!*

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chanical, hydraulic and electrical drives for the application of constant cutting speed control to a lathe, the Springfield Machine Tool Co. selected the electrical type consisting of a variable voltage motor-generator set with electronic field control. This problem was analyzed by R. C. Montanus, vice-president of that company, and E. B. Ankenman, Westinghouse consulting and application engineer, who also explained the operation of the A V Drive on this lathe.

O. G. Rutemiller, chief engineer of the Morton Manufacturing Co., gave several applications of broadening the use of standard electrical equipment on machine tools. The d-c braking of induction motors was the subject of a paper by Fred Snyder, Westinghouse engineer.

Fatigue Limit of Chromium-Plated Steels

RECENTLY the National Bureau of Standards made an extensive study of the effect of chromium plating on the fatigue limit of steels used in aircraft. This investigation provides information of interest not only to aircraft manufacturers but also to a number of other industries that produce or utilize chromium-plated machine parts.

It is generally agreed that residual stresses in a material markedly affect its fatigue limit. Thus, in steel, compressive stresses, such as are produced by shot peening, increase the fatigue limit; tensile stresses have the opposite effect. In order to show the presence of tensile stresses in electrodeposited chromium and the effect of heat treatment on these stresses, thin-walled tubes of annealed steel were chromium-plated and subsequently heated to different temperatures. Tongues, strips about 3/16 in. wide and two in. long with one end left attached, were then cut in the tubing to permit a qualitative evaluation of stresses in chromium plate.

Tongues cut in plated tubing that had not been heated were found to bend slightly outward from the surface of the tube, indicating the presence of residual tensile stresses in the plated layer. Baking the plated tubes at temperatures around 200 C was found to further increase the tensile stresses in the chromium, as shown by the greater bending of the tongue away from the tube surface.

From these observations, it was concluded that the decreased fatigue limit accompanying the heating at 200 C of the plated fatigue-test specimens was due to increased tensile stresses induced in the chromium plate. This conclusion has been further substantiated by experiments showing that electrodeposited chromium subjected to a heating and cooling cycle increases in density and

(*Turn to page* 122, *please*)

GLOBE·UNION

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1. Solid, large, connecting links speed the flow of current.
2. Double-pour leak-proof seal
3. Stop-spill safety vents
4. Life-anchor posts cast in one piece with separator hold-downs
5. Flex-rubber bushings absorb shock, prevent leakage
6. Large space for acid above plates
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9. Perma-set, "crateriized" plates
10. Pebble-coated interlocking v-shaped grid bars
11. High tensile strength container
12. High foot rests for plates

Uniformity of quality is characteristic of Globe-Union batteries regardless of which of the 12 Globe-Union factories produce the batteries. Strategically placed local factories insure lowest freight costs and faster service.

New Applications for Powdered Metals

(*Continued from page* 37)

While tensile properties of powder metal parts have not been considered an important factor up to recently, the incursion into the field of machine and structural parts has led to experimental work which promises tensile strength in excess of 100,000 psi through suitable heat treatment.

Electroplating, coloring, enameling, and other methods of surface finishing have been developed to a satisfactory state at the present time. Electroplating was not successful up to recently because in parts of low density the electrolytic solution could become trapped in the pores and later reveal "bleeding." More recently, however, even this handicap has been overcome through research and development of new techniques.

As in the case of many other special techniques, powder metal production is subject to certain limitations as to the size and form of parts and sections; considerations of volume to justify the cost of dies and set-up time; tolerances, projections, etc. Such problems are best handled directly with the fabricator before the design of any part is frozen.

Because the field of powder metallurgy is nationwide and includes suppliers of powders as well as many parts manufacturers, this article is intended to cover only a high-spotting of some of the companies. It is a survey article and is not to be considered as all-inclusive. Those manufacturers not specifically mentioned here will be covered later on.

It may be noted that in the opinion of some of the companies listed below the dramatic phases of powder metallurgy are about over and from now on they expect more action in improving existing applications, improving materials and production techniques, and the development of products not now made by sintering.

American Electro Metal Corp.: This company produces iron-silicon compacts, sintered steel, iron compacts, heat treated steel parts.

Amplex Mfg. Co., Div., Chrysler Corp.: Refer to comprehensive article in AUTOMOTIVE INDUSTRIES, Nov. 1, 1949.

Bound Brook Oil-Less Bearing Co.: With a background of almost 30 years of production of bearings and parts, this company currently supplies the following line of powder metal parts:

1—Compo, oil retaining, porous bronze in a series of grades for bearings, bushings, and structural parts.

2—Powdiron, sintered iron, in a series of grades, including high density hardened irons and steels—for bushings, bearings, and structural parts.

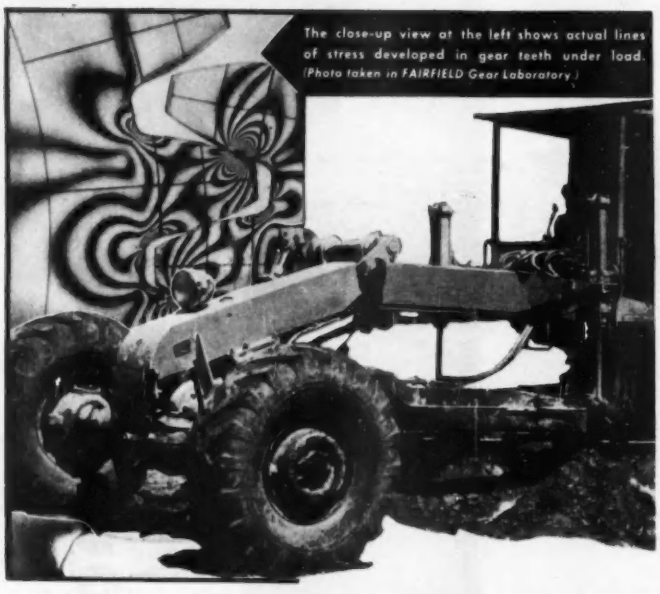
3—Compo filter material in four standard grades.

4—Powdiron magnetic irons.

Among the parts supplied by the company are: brake shoe assemblies, brake shoe pins, chassis bearings, clutch pilot bearings, clutch release shaft bearings, water pump parts, door latch and hinge mechanisms, transmission thrust washers, steering column bearings, spring eye bushings, oil pump gears, windshield wiper parts.

Henry L. Crowley Co.: Engaged primarily in the manufacture of sintered parts for the radio and electronic industry—Magicores and magnetic components—this company also produces parts for the automotive field. Among these are: Crolite ceramics, a new Crolite filter for liquids and gases, made in the form of disks, cylinders, cones, plugs, etc.; and mechanical parts made of iron, brass, bronze, nickel-cobalt, and aluminum.

(*Turn to page* 120, *please*)


The close-up view at the left shows actual lines of stress developed in gear teeth under load. (Photo taken in FAIRFIELD Gear Laboratory.)

Helping to make a good product

Even Better!

Polarized light used with photoelastic equipment to check stresses and strains in gear teeth is just one of the many steps Fairfield takes to help make good products even better! There is no finer recommendation for the quality of the product you sell than to be able to say that it is "Equipped with FAIRFIELD GEARS!" Long producers of the gears needed in high grade trucks and tractors, Fairfield now brings the same standards for gear performance to a wide variety of products: Road Graders...Machine Tools...Diesel Engines...and a host of others. Get acquainted with FAIRFIELD! Send for interesting, illustrated brochure.

FINE GEARS *Made to Order!*

Spiral Bevel • Straight Bevel • Hypoid • Herringbone
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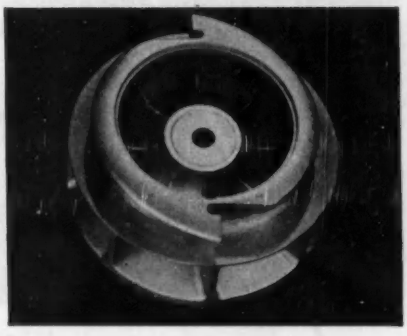
MAGNESIUM DIE CASTINGS

They're Priced Competitively with other Materials!

Hundreds of successful applications have proved magnesium a useful die casting metal—one that offers many advantages over other die casting materials. Yet, you don't pay a premium price for magnesium. *Magnesium die castings are priced competitively with those in other materials*, and in many cases they are cheaper.

Complicated Design?



Dow can do it in Magnesium!

Because magnesium does not solder to the die, complicated parts are often easier to cast in this light, strong metal. The cooling fan shown above is an example. Eight sliding cores are necessary in the die that produces this part. As produced in magnesium with a cast-in steel insert, it meets all design requirements.

But whether the design of your part is complex or simple, it will pay you to investigate magnesium die castings. Magnesium alloys have better dimensional stability—tolerances of 0.0015″ per inch can be maintained on production runs. They are the easiest of all alloys to machine, and a full one-third lighter than any other die casting metal.

If you have a die casting application, consider magnesium. Call in a Dow representative for expert assistance. Use Dow's production facilities for quality die castings at competitive prices. For additional information about magnesium die castings, write Dept. MG-12 in Midland.

Magnesium Division

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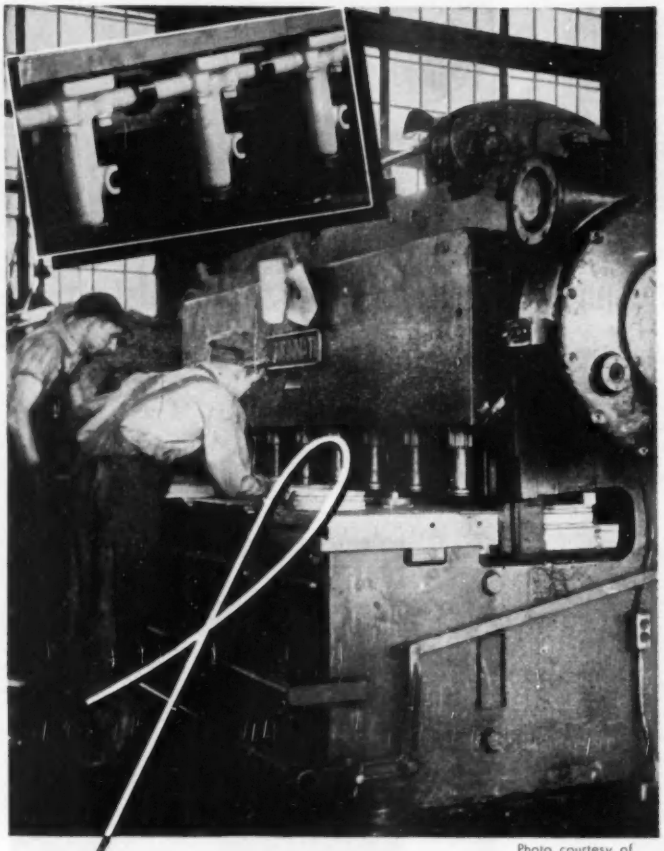

Photo courtesy of
The Cincinnati Shaper Co.

Forgings from **KROPP**

A giant power shear needs exceptionally rugged holddown fixtures to withstand heavy vibrational stresses while holding work under tons of pressure. Kropp forged steel parts are the answer.

Kropp forgings, because of their superior toughness, are chosen for the stressed parts of a wide variety of machines for metal working and machine tool manufacture . . . as well as for aircraft, automotive, oil production, diesel and farm equipment industries. Kropp drop, hammer and upset "Forgings to your specifications" have a record for dependable quality. We invite your inquiries.

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Are you receiving "FORGINGS" . . . . the KROPP publication for industry? If you want to keep current on forging facts, send us your name and address and ask for "FORGINGS".

Fansteel Metallurgical Corp.: An outstanding specialist in rare metal formulations, the company supplies a varied line of contacts for electrical systems including Fastell compositions containing either tungsten or molybdenum in combination with highly conductive materials such as silver or copper. Pure tungsten is supplied for ignition and voltage regulator contacts; while Fastell contacts containing tungsten-carbide are made for heavy duty voltage regulators for trucks and buses. Another activity is that of supplying copper-tungsten compositions used in facings for resistance welding dies produced by its Weiger Weed & Co., Div.

Johnson Bronze Company: Confining its activities entirely to bronze bushings and bearings, this organization produces bushings for water pumps, steering gears, starters and starter plates, clutch pilots, wheel spindles, distributors, generators, transmission pilots, windshield wipers, and throttle controls.

Michigan Powdered Metal Products Co., Inc.: Produces parts and bushings of ferrous and non-ferrous compositions, including shock absorber rod guides and pistons, shock absorber base valves, pivot stops for window regulator assemblies, oil pump gears, vanes for oil pumps, rotors, and valve guides. In addition, the company recently announced a new type of bearing for motors, conveyors pillow blocks, etc. Known as the "Haller Oil Well" it is of iron base heavy load type, having a cavity or sponge cast within the body, filled with oil or grease.

Moraine Products Div., General Motors Corp.: One of the largest producers of machined parts and bearings, the company has concentrated recently on the development of new processes and applications for existing materials. Stemming from this activity is a process for producing gears for relatively heavy duty use. The material is not new but a way was found of filling the void with another basic material, thus resulting in a high strength product.

The company also mentions its earlier difficulty in rustproofing parts made from Durex iron where the use of oil was detrimental or not practical. Electro-plating was not successful at the time owing to the tendency of plating salts to "bleed-out." More recently, however, Moraine has introduced a process similar to electroplating but entirely free from "bleed-out."

Among the many applications of Durex bearings, including main and connecting rod bearings for gasoline and Diesel engines are the following: convertible top, clutch throwout, starter, generator, distributor, windshield wiper, water pump, heater motor, overdrive governor, clutch pilot, oil pump drive shaft, door latch, door hinge, door check, clutch lever, accelerator, oil pump body, and speedometer drive gear.

(*Turn to page* 122, *please*)

Castellated Nuts Replaced—

ELASTIC STOP NUTS SAVE PRODUCTION TIME...MONEY

STERLING HEAVY-DUTY DIESEL TRUCK

The Red Elastic Collar Keeps Production Costs DOWN... *Production* UP!

On the engine rear support bolts of the Sterling Heavy-Duty Diesel Trucks, Elastic Stop Nuts have replaced castel nuts and speeded up production in a typical example of assembly line fastener simplification.

Sterling found that Elastic Stop Nuts provided the necessary positive fastening security at lower cost. Why? Because Elastic Stop Nuts lock in position anywhere on a bolt or stud—and only ONE adjustment is necessary—the first. The self-locking, self-sealing Red Elastic Collar provided the "grip-dependability" Sterling needed to keep their precise settings permanent. No amount of vibration, impact or heavy field duty can shake Elastic Stop Nuts loose.

And all Elastic Stop Nuts keep bolt and nut threads rust-free . . . seal against liquid seepage along bolt threads . . . do not damage the threads . . . and are reusable.

HERE'S A CHALLENGE: Send us complete details of your toughest bolted trouble spot. We'll supply test nuts—FREE, in experimental quantities. Write: Elastic Stop Nut Corporation of America, Union, N. J. Representatives and Agents are located in many principal cities.

ESNA

THE FAMOUS RED ELASTIC COLLAR IS VISIBLE EVIDENCE OF LOCKING SECURITY

Threadless and permanently elastic, it provides these 4 outstanding features:

1. Protects against nuts loosening due to VIBRATION
2. Keeps locking threads CORROSION FREE
3. Provides for accurate BOLT LOADING
4. Seals against LIQUID LEAKAGE along the bolt threads

ELASTIC STOP NUTS

OVER 450 TYPES AND SIZES IMMEDIATELY AVAILABLE FROM STOCK

Among special or structural parts are: camshaft thrust plungers, pedal shaft lock pins, static collector buttons, clutch throwout ball retainers, clutch buttons, transmission oil pump gears, valve lifter guides, oil pump gears, shock absorber pistons and rod guides, heat control valve bodies, thrust washers, pump rotors and vanes.

The New Jersey Zinc Co.: A supplier of non-ferrous powders, is the source for Horse Head brand brass powders, copper, zinc, and bronze compositions, made by a proprietary atomization process.

Plastic Metals Co.: Specialist in the manufacture of iron powders, including such materials as: electrolytic iron powder; steel powders—iron with carbon, manganese, and other elements; sponge iron powder having high compressibility; electrolytic manganese, nickel, silicon powder.

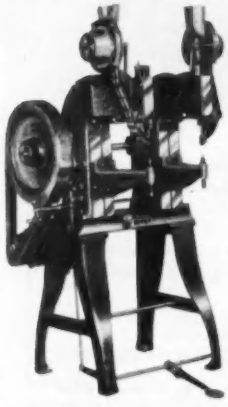
Powdered Metal Products Corp. of America: Producer of a variety of bearings, structural parts, electronic parts, and filters, it has recently developed a unique method for making helical gears. Among the structural parts are gears, ball bearing retainers of bronze, miscellaneous cams and ratchets, lock plugs and cylinders for body hardware. Electronic parts include—pole pieces for meters and circuit testers; and permanent tuning cores used in auto radio. The company also supplies all types of self-lubricating bearings, and all types of bronze and stainless steel filters for gasoline and Diesel systems.

Raybestos-Manhattan, Inc., The Raybestos Div.: This organization specializes exclusively in the production of sintered metallic friction materials. Its activities were described in an article which appeared in the Feb. 1, 1950, issue of AUTOMOTIVE INDUSTRIES.

The S. K. Wellman Co.: One of the important producers of powder metal friction materials, the company is a supplier of friction disks for clutches in various makes of automatic transmissions, including heavy duty torque converter drives for buses and trucks. The company also supplies friction elements for master clutches, clutch brakes, steering clutches, power takeoff clutches and brakes, vehicle brakes, etc. The sintered metallic friction material for such applications is made in a variety of grades and types, ranging from the lowest coefficient, high wear-resistant materials to very high coefficient materials.

Wel-Met Co.: Producer of structural parts and bearings for the automotive industries including the following major items: bearings, rotors for oil pumps for power operated windows, door lock rotor gears, oil pump gears, cams, thrust washers, brake adjusting pins, and brake shoes for automatic clutches.

WHATEVER YOU FASTEN . . .
COMPOSITION TO COMPOSITION
FABRIC TO FABRIC
WOOD TO WOOD
METAL TO METAL
OR ANY COMBINATION OF THESE MATERIALS . . .
LEATHER TO LEATHER
Chicago AUTOMATIC RIVETING
FASTENS IT RIGHT . . . AND FASTENS IT FAST



In Chicago Automatic Rivet Setters from 1 to 4 tubular or split rivets are fed, inserted and clinched in a fraction of a second with each operating pedal release. Adjustment on some models permits handling different sizes of rivets. Riveting machine also adaptable for eyelets, grommets or drive screws.

FREE Fastening Analysis

Your output may be increased and cost reduced if you investigate. Send sample assembly and blue print.

Chicago Rivet

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TUBULAR AND SPLIT RIVETS IN ALL RIVET METALS

Fatigue of Chromium-Plated Steel

(*Continued from page* 116)

thereby contracts; since no significant dimensional changes occur in the steel upon completion of the cycle, the steel tends to restrain the complete shrinkage of the chromium layer and thereby increases the tensile stresses in it. If the chromium-plated steel is heated to a sufficiently high temperature (above 400 C), the contractive forces in the chromium produce sufficient tensile stresses to cause plastic flow or rupture of the chromium plate, thus relieving the residual tensile stresses in it. Thus, when tongued tubes were heated above 400 C, the free ends of the tongues were depressed below the surfaces of the tubes, indicating a release of the restraint in the steel initially caused by residual tensile stresses in the chromium. This suggests that the increased fatigue limits produced in the fatigue specimens heated above 400 C were caused by stress relief in the chromium plate accompanying its plastic flow or rupture.

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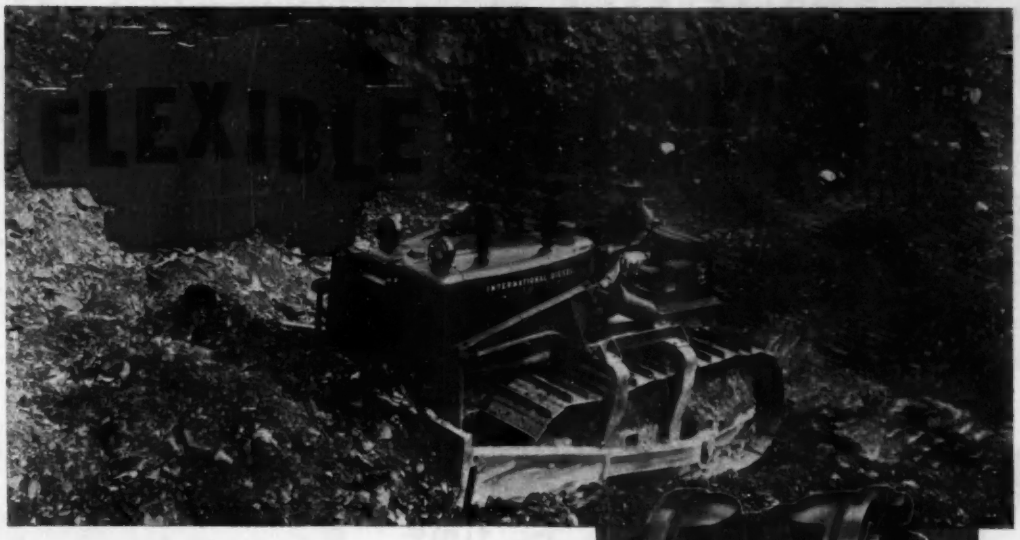
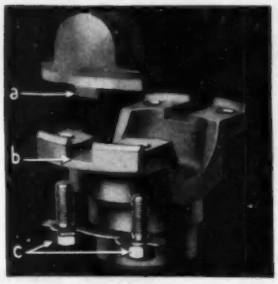
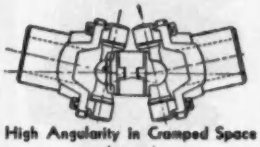


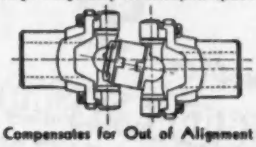
Modern Crawler tractor design requires a F-L-E-X-I-B-L-E connection between the engine and transmission. MECHANICS Close-Coupled Type UNIVERSAL JOINTS not only provide for high angularity within cramped space but compensate for out-of-alignment conditions. The shocks and strains that crawler tractors encounter in heavy duty work often are so great that they temporarily twist the tractor frame. MECHANICS Close-Coupled Type UNIVERSAL JOINTS are designed to provide the F-L-E-X-I-B-I-L-I-T-Y needed to make efficient operation possible under such adverse conditions. MECHANICS exclusive KEY method of driving has the highest safety factor, transmits the most torque, and averts costly breakdowns that result from driving through bolts or screws that work loose. Let our engineers show you how these MECHANICS advantages will benefit your product.



Drive Thru Strong KEYS (a) That Fit into Keyways (b) Screwbolts (c) Do Not Carry Any of the Torque Load.



High Angularity in Cramped Space



Compensates for Out of Alignment

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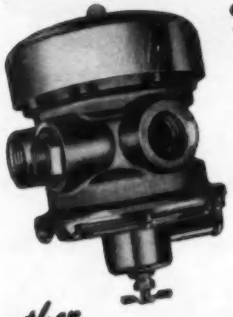
Maximum Braking in 1/3 the Time



- **BUILT-IN FAST ACTION TANK VALVE.** Directly connects full engine vacuum to power chambers. Action is automatic and positive. Keeps tank vacuum as reserve.
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- Integral moisture trap, drain cock and air cleaner.
- **BUILT-IN AUTOMATIC EMERGENCY BRAKE APPLICATION.** Applies trailer brakes automatically if connecting lines are broken.
- **COMBINATION "4-IN-1" UNIT.** 25% lighter than total of parts replaced.

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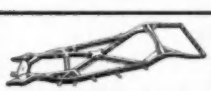


Air and Electro-Pneumatic DOOR CONTROLS

New Lancia Aurelia

(*Continued from page* 41)

rods on separate crank pins. Lubrication is full pressure type by a gear pump driven off the rear end of the camshaft, drawing oil through a metallic filter in the crankcase and passing it through an external filter on the left side of the engine. To assure adequate cooling, the oil pan is ribbed both on the bottom and sides. A triple roller chain is used for camshaft drive and is provided with a hydraulic tensioning device. Normal compression ratio is 6.85 to 1, and maximum output is 56 hp at 4000 rpm. Maximum torque is obtained between 2500 and 3000 rpm, corresponding to 41.5 hp. The cooling system includes a belt-driven pump, a cast aluminum fan, and thermostatic control.

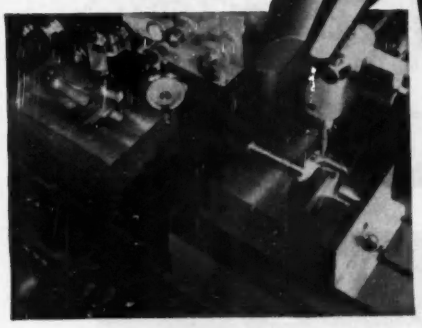
One of the features of this layout is that the engine is entirely independent of both clutch and transmission, and is carried in the frame on rubber bushings at four points. With this arrangement, there are two independent units, the engine in front and the transmission at the rear, with the result that the tunnel for the propeller shaft with three universal joints is of very small dimensions and a lower floor is provided.

The rear assembly comprises a rubber coupling, an enclosed single plate dry clutch, a four-speed transmission with three synchromesh gears, and a final drive with a ratio of 4.7 to one. The ribbed brake drums are at the inner ends of the open axle shafts. Suspension parts are combined with the unit and comprise triangular support arms with vertical coil springs supplemented by hydraulic shock absorbers. Attachment of the suspended unit is by means of two steel tubes, the forward of which is just behind the clutch housing, and the other behind the differential housing. There is a housing containing rubber blocks at the end of each tube, giving four-point attachment to the frame. The rear suspension anchorage is by means of two tubular arms, one of which is practically parallel to the side rails and the other at an angle of approximately 45 deg in relation to it. These two arms are pivoted to the frame in rubber bushings. Front suspension also is of the independent type, with vertical coil springs. Four wheel brakes are hydraulically operated, with mechanical hand operation for the rear brakes. It is claimed that this rear layout provides an exceptionally high degree of lateral stability, reduces unsprung weight and permits more effective cooling of the brake drums. The gearshift lever is under the three-spoke steering wheel.

Two types of bodies are provided, a four-door sedan and a cabriolet, these being unit construction. In addition, the Aurelia is offered in chassis form for custom-built bodies.

Turn out
MORE WORK
between grinds with
T-J CUTTERS!

Less breakage... Lower Cost!



T-J Cutter at work on a Cincinnati 16" Vertical Hydrotel, latest design Die Sinker. A cutter of the right design and heat treatment for this high speed work in tough die steels, making possible the maximum efficiency of these new machines.

Your die costs go down . . . and you can raise the feed . . . using T-J Die Sinking Milling Cutters! Because of their advanced design, these cutters help you get the utmost in *accuracy, speed* and *efficiency* from your machines. T-J builds these sturdy cutters from a standard, extremely high grade steel . . . properly machined . . . scientifically heat-treated and accurately ground. They're *extra rugged* . . . hold a sharp edge longer . . . less breakage! Wide range of T-J standard styles and sizes saves time and money for you! Send for new catalog 150. The Tomkins-Johnson Co., Jackson, Michigan.

33 YEARS EXPERIENCE (T-J)
TOMKINS-JOHNSON
DIE SINKING MILLING CUTTERS

Aircraft Trends—Automobile Design

(*Continued from page* 35)

design consideration in aviation. Great strides have recently been made in this field by improving vision, pilot comfort, ease of control, and arrangement of interiors for crash survival.

Vision

For many years aircraft downward vision was in the order of zero or at best a few degrees below the horizontal. It was not satisfactory but was tolerated because in early designs it was essential for balance and other more important considerations. In recent years both flight and ground handling safety considerations demanded greatly improved downward vision. As a result, methods were found to move pilots further forward and to increase downward angles over the nose to a minimum of 15 deg and in many cases 20 deg or more. Upward and side-upward vision has also been increased correspondingly. While side-upward vision is of much greater importance to aircraft because of the need for banking in turns, it is also important to automobile operation in the hilly cities of the West.

In aircraft windshield design it has been found essential to keep windshield glass as close as possible to the pilot's eyes for maximum visibility in rain and fog. To avoid blind spots, windshield posts in aircraft are kept as narrow as mechanically possible, usually less than two-in. in width, never over the eye pupillary spacing of approximately 2.5 in. Current automobile practice is 3 in. plus. Every effort is also made to keep windshield posts as far as possible to the side of the normal forward line of vision to increase the unobstructed field of forward vision.

Comfort

During the war years exhaustive studies were made with human beings of all anatomical proportions to determine the most comfortable seating arrangements and the arrangement of controls. These studies resulted in modern cockpits so arranged that all controls, switches, etc., can be reached by the movement of arms alone no matter what the position of the pilot's seat. While aircraft seat adjustment requirements are perhaps too severe for automobile application, it is believed that aircraft experience indicates the advisability of arranging seats to move upward from two to three in. as they are moved forward.

Control

It is unquestionably agreed by all who have operated high speed and long range vehicles of any type that safety can be greatly enhanced by improving ease of control, increasing control response, and the arrangement of controls for minimum fatigue. To this end great strides have been made in aircraft design and every indication is that controllability must improve with increased operating speeds. Improved high speed road stability, shorter turning radius, and shorter stopping distances might be considered as important characteristics under this subject.

Crash Survival

Very careful consideration has been given the interior of airplane cockpits for greatest crash protection. Seat and shoulder harnesses and seats with strength of 40 g, 40 times weight of occupant, have contributed greatly to the safety of combat and training planes. Careful arrangements and proportions of steering wheels, control sticks, knobs, levers and crash pads at cowl edges have also reduced crash

(*Turn to page* 128, *please*)

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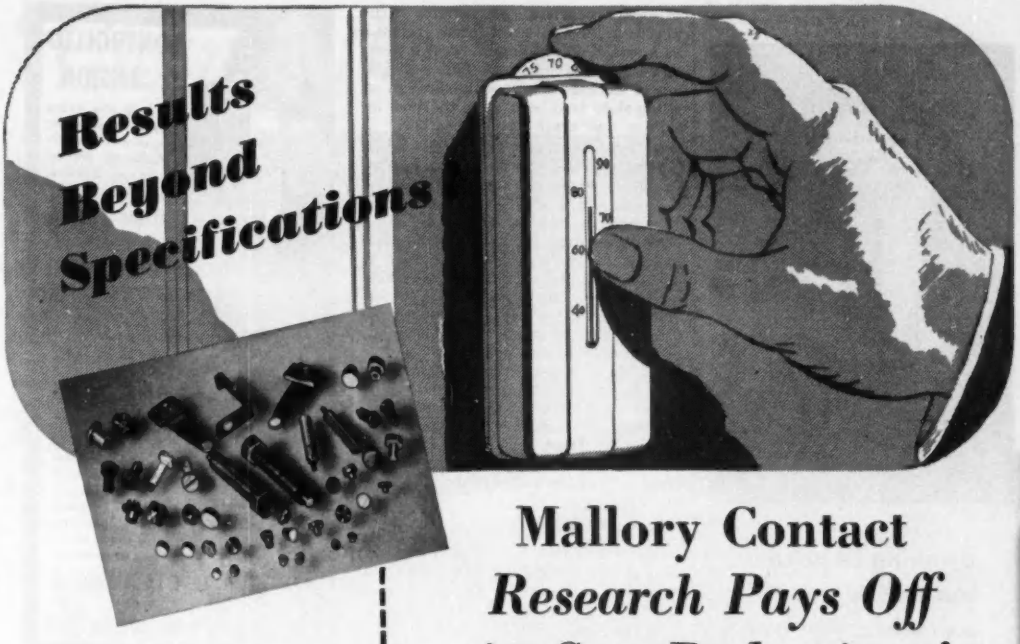

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injuries considerably. Cellular foam plastic materials show great promise as a means of padding structural parts to resist head injuries. This material might be used to good advantage in automobile tops both as a thermal insulator and crash shock absorber.

Although not always possible, it is current practice, particularly in combat airplanes, to design cockpit structures to withstand a 40 g load of all items of equipment located aft of the pilot. Experience has indicated that many crashes could have been survived if structure around cockpits had been able to withstand the crushing effect of masses behind the pilot. For automobile design this becomes somewhat more difficult due to the absence of safety belts, but it might be that hinged front seat backs should be arranged to be locked or interlocked with front doors in order that rear occupants would not force front occupants into the windshield or instrument panel in the event of head-on collisions.

Instrument Lighting

Also considered an important safety item is the recent red lighting of instruments and cockpits. Indirect or red floodlighting of instruments and controls has been found to give the maximum interior illumination with minimum effect on night vision acuity. Edge lighting of lettering for all controls prevents groping and minimizes distraction.

Construction and Production

Aircraft construction details are as a general rule influenced almost entirely by weight and structural efficiency considerations rather than cost. As a result many new high strength alloys of aluminum, magnesium and steel have recently been developed. Since the average cost of aluminum alloy is approximately $0.45 per lb to the aircraft industry as compared to approximately $0.045 per lb for average automobile grade steels, it is doubtful that aircraft structural materials will have a great effect upon automobile design, at least during the near future. The high requirements of quality in aircraft parts have nevertheless had a beneficial effect upon high strength automotive steels and should result in increased volume favorable to the automobile industry.

Aircraft construction methods, while geared to smaller quantities, have as a rule a high degree of flexibility and appear to be of benefit to the automobile industry, especially for small or experimental quantities. For example, the Western Pressed Metals Div. of the Douglas Co. has been very successful in producing sheet steel stampings of fenders, splash pans, and many similar parts utilizing aircraft type presses, drop hammers, and simple zinc dies. While this activity was originated to supply replacement parts for pre-war

(*Turn to page* 130, *please*)

a *saving* in *price* can *add* to your *cost* when you buy any but the *best* of fasteners!

The price of a *good* fastener is *low*—in terms of final product cost.

But the final cost of an ordinary fastener can be many times its price—in terms of high assembly cost.

So we think it's reasonable to say—"You may buy a *cheaper* fastener than a Scovill—but you'll never find one that *costs* less!"

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"Change the Steel"... we suggested

A 14.3% increase in production and a 300% increase in tool life are potent factors in reducing costs. Especially when they're obtained on a vital part like this that requires considerable machining to very close tolerances.

Trackson Company, Milwaukee, in producing this drum shaft for the winch of their famous "PIPE LAYER," formerly used 4¼" round bars heat treated to 269-321 Brinnel. Low tool life and machining difficulties ran up the cost and slowed production.

After studying the problem, one of our metallurgists suggested a special U·S·S Carilloy Steel. It worked like a charm . . . gave not only better machinability but better mechanical properties as well. "As a result," says Trackson's purchasing agent, "we feel that many other of our applications requiring considerable machining should be made of this steel."

This steel is only one of the many superior alloy steels we produce for the automotive and other industries. But it happens to be just the *right* analysis for a job like this. We were able to recommend it with confidence because of our unusual background of research and experience.

If you want similar constructive cooperation, bring your steel problems to us. Because we produce alloy steels in all grades—in all finishes and treatments—and in the widest range of forms and sizes, our recommendations to you are based solely on the particular requirements involved. In other words, *we fit the steel to the job, not the job to the steel.* This practical approach to steel application has saved many individual steel users thousands of dollars yearly in lower production costs. We'd be glad to help you make similar savings.

Trackson MD8 Pipe Layers laying 34-in. pipe line through rugged terrain from Needles to Milpitas, Calif. Heavy duty operation like this demands plenty of reserve strength in all vital parts—Carilloy Steel in the winch main shaft supplies it.

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Carilloy Steels

ELECTRIC FURNACE OR OPEN HEARTH — COMPLETE PRODUCTION FACILITIES IN CHICAGO AND PITTSBURGH

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UNITED STATES STEEL

cars for which tooling was no longer in existence, the enterprise became so successful that parts are now being made for new car production.

Reduce Drag and Weight

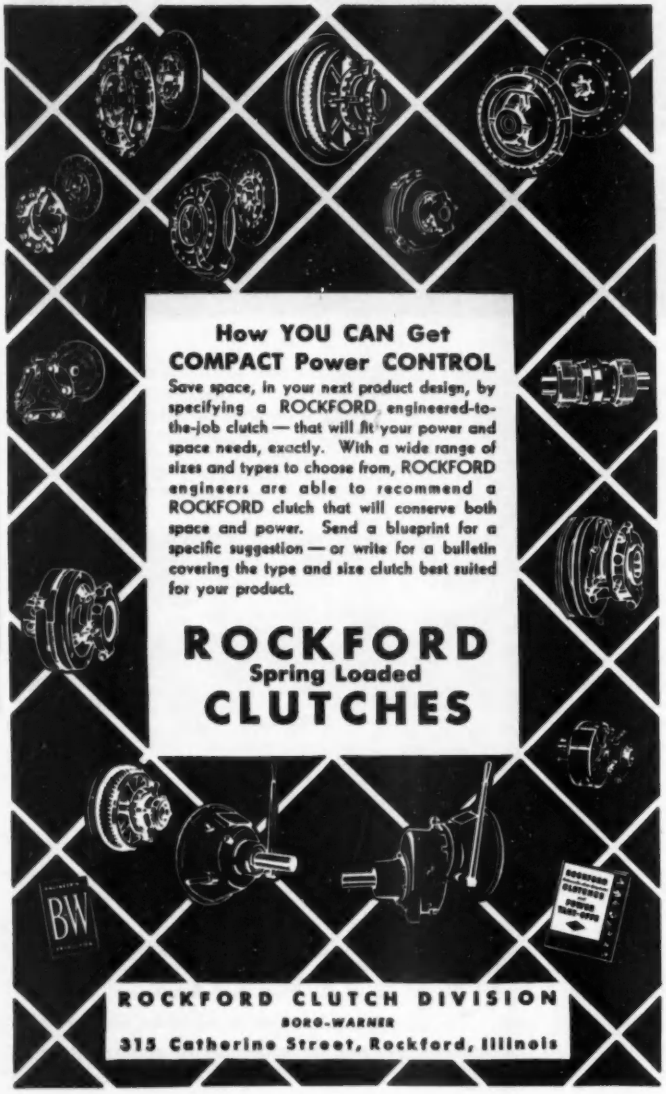
The two most important aircraft design requirements are for minimum aerodynamic drag and minimum weight. Since aircraft drag increases as the square of speed, and each pound of useful load or equipment carried accounts for 5 to 10 lb of gross weight, the importance of these considerations is obvious. These factors of course do not apply directly to automobile design, but they are similar, and it appears that both aircraft and automobile designers would do well to give more serious consideration to the reduction of drag and weight if the ultimate in efficiency is to be attained. At speeds of 40 or 50 mph aerodynamic refinements have relatively little effect on automobiles. But it is believed that considerable improvement can be made in the reduction of drag and buffeting at the higher cross-country cruising speeds to which we have now become accustomed. Weight reduction will of course improve acceleration and stopping qualities in city traffic, thus directly affecting daily operational expense and safety.

Style Differences

The airplane has no doubt had a marked effect upon the streamlining of a great variety of modern industrial equipment items, including automobiles —not always with the best results. Nevertheless, some of the principles of fuselage and windshield design can advantageously be applied. Some examples of this influence would be increased slope of windshield, improved body streamlining, improved engine cooling air intakes and louvres, and in general eliminating discontinuities and unnecessary trim.

Perhaps the greatest difference between aircraft and automobile design philosophies is the scientific or functional approach of the former and the aesthetic approach of the latter. It is realized that styles and aesthetic taste are now extremely essential in automobile design. It is believed, however, that scientific and functional reasoning and economics will ultimately govern automobile design as aircraft design is governed.

In aircraft design little or no consideration is given aesthetics except, of course, for interior trim. This was not always the case. Early designers were frequently inspired by their aesthetic or artistic senses, particularly in fuselage and tail surface arrangements. Such inspirational designing is now a thing of the past and the best airplanes are conceived upon purely scientific and functional reasoning with the result that an airplane that is good looks good, and beauty is the final test of design excellence.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BORG-WARNER
315 Catherine Street, Rockford, Illinois

Buick Transfer Line

(*Continued from page* 34)

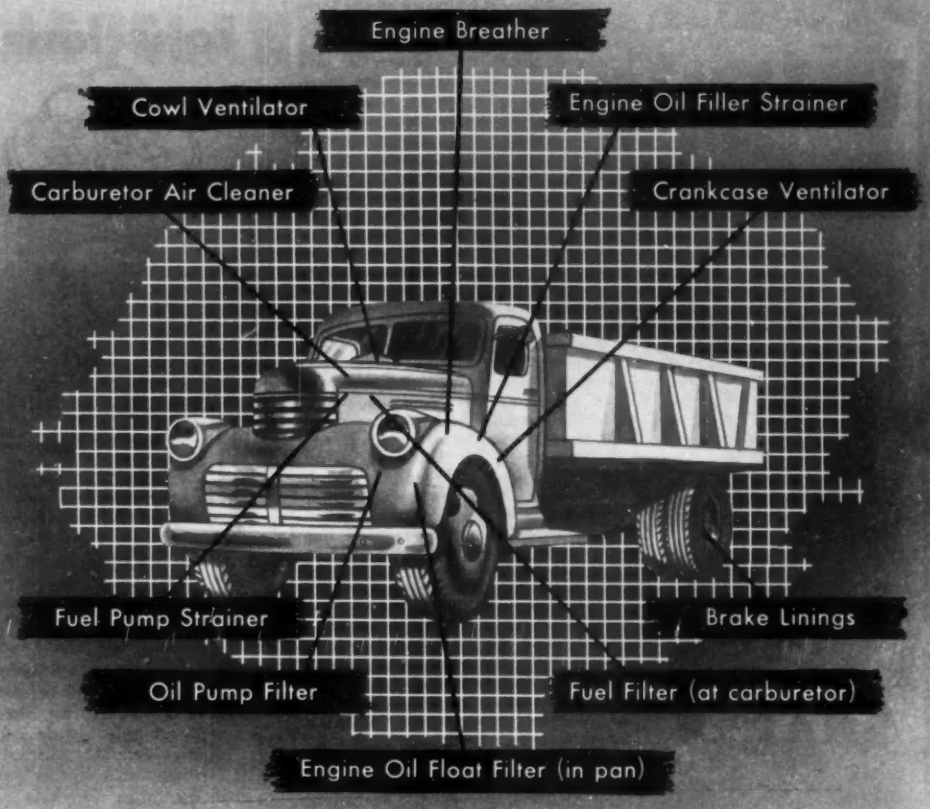
pendently mounted control cabinets, and separately mounted hydraulic system.

The first of the W. F. & John Barnes machines has the following arrangement of heads on right and left sides for drilling both ends of the block:

The next group consists of two Greenlee transfer machines, one at the end of the first line in this bay, the other starting a parallel line. It is of interest that the transfer of work from one machine to the other is done automatically and in harmony with line function by means of an automatic cross transfer conveyor installed at right angle to both machines. The first Greenlee is a 10-station machine with 90 drilling spindles, having the following sequence of operations:

Next in the line is one of the familiar Ingersoll eight-station cam and crank boring machines, following assembly of bearing caps and bolts on the conveyor. Semi-finish boring and finish-reaming of the 16 valve lifter bores, drilled in the Greenlee, is done in a battery of two machines which will be replaced later with a five-station transfer machine.

(*Turn to page* 132, *please*)



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Looking back at the routing it will be recalled that cylinder bores were rough-bored in eight-spindle boring machines. The next operation on the bores is semi-finishing in another Ingersoll boring machine. This is followed by precision-boring in a battery of four Ex-Cell-O vertical eight-spindle precision boring machines of exactly the same type as the ones installed on the earlier transfer line. Buick depends upon the exceptional accuracy of the Ex-Cell-O equipment for finishing bores to size and alignment and straightness.

An Ex-Cell-O special boring machine is used for finish-boring for the five crankshaft main bearings in cast iron, holding to 0.001 in. on diameter; 0.001 in. for alignment; and 0.0005 in. for out-of-round.

At this point the camshaft bearings are assembled in the crankcase in a special OilGear hydraulic press, followed by water testing.

A three-way Greenlee boring machine is found at the succeeding stage for the finish-boring of the five camshaft bearings (in babbitt); finish-reaming, facing and drilling miscellaneous holes, including the distributor hole which is reamed in exact relationship with the camshaft bearing line while held in the fixture. Boring of camshaft bearings is held to 0.002 in. on diameter and for roundness.

Buick practice is to mill the top face of the block at the start of operations, then correct this face and get it to proper height with respect to the crank line by surface broaching. Here they employ the same type Cincinnati horizontal tunnel type surface broaching machine originally installed on the first transfer line.

At the end of the finish line, cylinder bores are given a double honing in multiple-spindle Barnesdril honing machines, primarily to correct for surface finish and to produce the desired lap pattern. Here too Buick will install Barnesdril honing machines of advanced type later on in the program.

As described in the original article, cylinder bores are sized and marked in code for diameter in eight-spindle Sheffield gaging machines. Although the machines are designed to select a range of ten sizes, production tolerances are so held as to maintain bores within a range of three major diameters to reduce the number of production pistons. Sizes are selected in steps of 0.0003 in. Bores are held to 0.001 maximum taper for the full length of the bore; 0.00075 in. maximum out-of-round; and 0.0015 in. maximum axis alignment for the length of the bore.

It is worthy of mention that blocks are washed several times during the sequence outlined above. Following roughing operations and before the blocks enter finishing stages, they go through a new Blakeslee washer to remove chips and dirt and oil. After gaging of bores, the blocks are passed through the familiar Detrex washer for a thorough cleaning in preparation of engine assembly.

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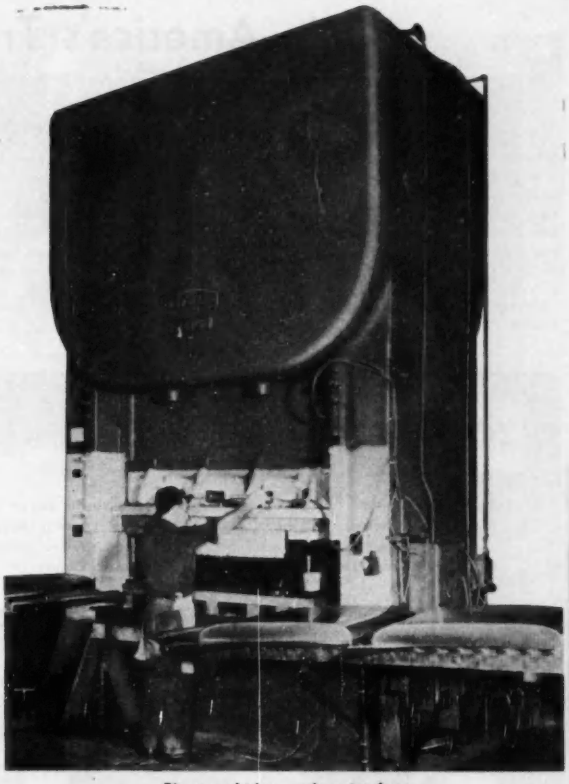
produce many
Refrigerator parts

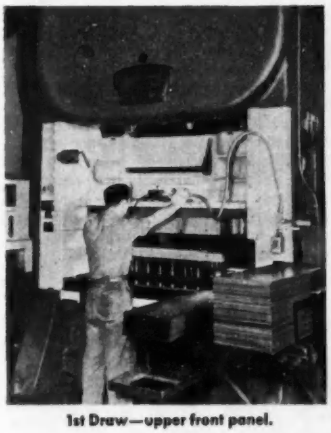
At the main plant of a large appliance manufacturer, thousands of refrigerators roll off the production line daily. As shown here, Clevelands handle many of the metal forming operations necessary in their production.

In comparison, your product may or may not be as famous as this refrigerator—your production line may not necessarily be as large; nevertheless, equipment efficiency and dependability are of utmost importance. With competition steadily increasing there must always be a concerted drive toward lower production costs.

Inspect your present Press equipment! Take advantage of the many design improvements that have been incorporated in all Cleveland Presses for greater Press efficiency. Their trouble-free operation, rigid construction and the exact control provided by the patented Cleveland Drum Type Clutch will give you lower production costs and longer die life.



Pierce and trim—main outer door.



1st Draw—upper front panel.

Trim and redraw—freezer compartment cover.

1st Draw—top outer door.

THE CLEVELAND PUNCH & SHEAR WORKS CO. U.S.A.

Established 1880

PUNCHING TOOLS & DIES

FABRICATING TOOLS

POWER PRESSES

OFFICES AT:
NEW YORK . . . CHICAGO
DETROIT . . . . PHILADELPHIA
PITTSBURGH

CLEVELAND 14, OHIO

Latin America's Tractor Market

(*Continued from page* 45)

These imports, which have increased tractor use in Mexico almost tenfold in a decade, have been stimulated by the acute need for greater and more varied agricultural production. Since 1910, for example, population increased 60 per cent while farm output rose only 25 per cent. To correct this situation successive administrations have been opening new land to cultivation by expropriation of large estates and irrigation of arid regions. The National Farm Bank also aids small farmers by furnishing loans and know-how for tractor operation.

Several hundred small stationary engines are purchased annually by Mexico, most of them used for power generation in homes and on the farm. Germany supplied about half of this market before the war, but 95 per cent of these imports now come from the U. S., with about three to four per cent from Canada. English tractor sales since the war have averaged about 125 units per year.

JOHNSON TAPPETS
assure top grade quality and dependability in your engines. All the plus values of skilled craftsmanship, expert "know-how" and finest materials are automatically yours when you select Johnson Tappets.
automotive
tractor
industrial
The Johnson Self Locking Tappet Screw has proven most satisfactory in cast iron and steel tappets.
"Tappets Are Our Business"
JOHNSON JP PRODUCTS
INC.
MUSKEGON, MICHIGAN

Argentina

Argentina is the only Latin American country listed among the ten greatest trading nations of the world. Since her natural wealth is based on farming and grazing, however, the bulk Argentina's foreign trade traditionally has been with Britain. This situation changed immediately after the war when Argentina found herself with $1.2 billion in credits, and British industries unable to supply desired manufactured goods. As a result, our sales of tractors during 1947 and 1948 climbed to nearly six times the normal prewar average. In 1949, however, our shipments dropped sharply below the 1939-1941 level, being limited chiefly to those types not obtainable in other countries. A small portion of Argentina's purchases also are re-exported to Paraguay.

At present, nearly 32,000 tractors of all types are in use on the pampas, with practically every U. S. manufacturer represented. Heavy type injection models are in greatest demand because of high gasoline costs and the vast scale of farming enterprises. Britain has sold slightly over 4000 tractors in Argentina since the war, and Italian units have been introduced recently. In the stationary engine category, England supplies about 55 per cent of the market, U. S. about 12 per cent and the remainder is divided between Czechoslovakia, Sweden, Switzerland, Italy and France.

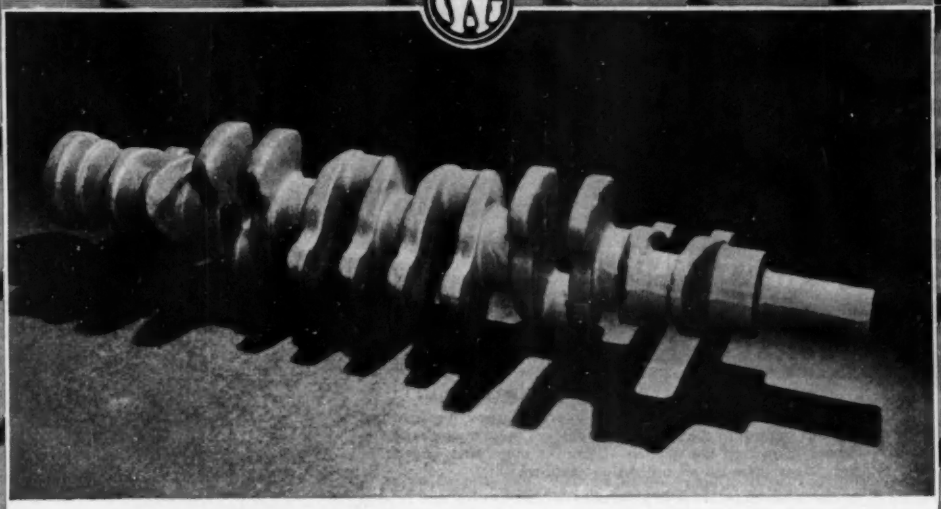
Most Argentine foreign commerce is handled through a state trading agency. Quantity purchases of equipment are made abroad, then resold to private distributors for fixed prices. Machinery not purchased through this agency is subject to stringent import license and monetary exchange regulations.

Venezuela

Chiefly on the strength of its petroleum exports, Venezuela has a relative abundance of foreign exchange. Artificial import restrictions are non-existent, and purchases are regulated simply by supply and demand. As a result, tractor sales have steadily increased during the past four years. In 1949, imports were almost five times the prewar level. However, this year's sales will level off as cutbacks are made in oil production.

Several factors are speeding farm mechanization in Venezuela. Farm labor runs as high as $1.50 per hour, and many of the nation's food staples are being imported at high prices. Moreover, the erection of several new

(*Turn to page* 136, *please*)



Diesel Power has become a major factor in the truck and tractor field. Here again Wyman-Gordon crankshafts are the standard of the industry.

Crankshaft Specialists since the birth of the internal combustion engine and today the largest producer of crankshaft forgings, Wyman-Gordon furnishes die forged cranks of all types and in weights up to a thousand pounds.

Standard of the Industry for More Than Sixty Years

WYMAN-GORDON

Forgings of Aluminum, Magnesium, Steel

WORCESTER, MASSACHUSETTS, U. S. A.

HARVEY, ILLINOIS - - - DETROIT, MICHIGAN

EF

Easier HEAT TREATMENT of LARGE, HEAVY CASTINGS

● The gantry crane shown with this battery of EF batch type furnaces picks up castings from a receiving platform — loads them into the furnaces — removes them after heating — lowers them into the quench — removes them after quenching and places them on an unloading platform.

Our wide experience in all phases of heat treating and related material handling problems, puts us in a preferred position to solve most any ferrous or non-ferrous annealing or heat treating problem. We solicit your inquiries.

THE ELECTRIC FURNACE CO.

GAS FIRED, OIL FIRED AND ELECTRIC FURNACES FOR ANY PROCESS, PRODUCT OR PRODUCTION

Salem - Ohio

The SYMBOL of QUALITY for 62 YEARS

WASHERS . . . Standard and Special, Every Type, Material, Purpose, Finish . . . STAMPINGS of every Description . . . Blanking, Forming, Drawing, Extruding.

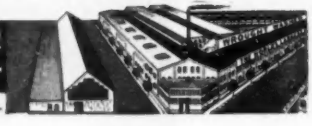
Your most dependable source of supply — the world's largest manufacturer of Washers, serving Industry since 1887. Over 22,000 sets of Dies.

Submit your blueprints and quantity requirements for estimates.

WROUGHT WASHER MANUFACTURING CO.

The World's Largest Producer of Washers

2212 S. BAY ST., MILWAUKEE 7, WIS.



refineries has recently lowered gasoline prices to ten cents or less per gallon. In spite of unsettled political conditions, the government has been making vigorous efforts to diversify and increase farm output, improve farming methods and better rural living standards.

Colombia

Colombian farm mechanization has generally paralleled developments in Venezuela, and tractor imports now average five times greater than prewar. Approximately 4500 tractors are now operated on Colombian farms with another 1200 in use by construction companies and industrial plants. While 95 per cent of this total is of U. S. manufacture, British sales have increased greatly during the past ten months. Our sales during 1950, however, will be influenced favorably by the recent $5 million loan from the International Bank for Reconstruction and Development. About $1.5 million of this loan is earmarked for tractor purchases in the U. S., while an additional $400,000 will be spent for parts and accessories. Generally, repair facilities are more complete than in Venezuela, and yearly imports of tractor parts from the U. S. exceed $1 million.

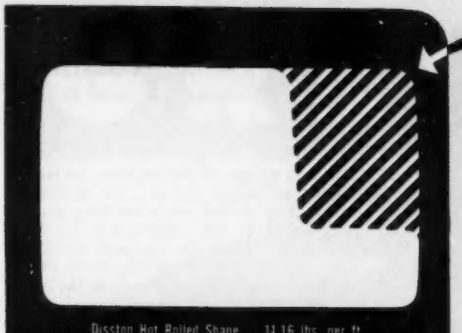
Unfortunately, topography of Colombia discourages mechanized farming in many areas. Land holdings are small and often broken by ravine sand steep slopes. Limited transportation also increases the cost of machinery arriving in the interior. Tractors, however, are classified as essential on the import lists, and are admitted with only negligible duty. Colombian officials have estimated an annual demand of 1000 tractors under normal conditions.

Chile

Tractors have appeared recently on Chilean farms, largely through the efforts of the Corporacion de Fomento. This government agency extends long term credits for farm machinery purchases, and has organized courses for tractor operators in combination with obligatory military service. Small farmers also are permitted and encouraged to use military shops for repair and maintenance—a plan which is being studied by several other Latin American governments. As a result, annual farm tractor requirements are now estimated at 1500 units. Tractors presently in use number about 5000, but 75 per cent are still operated by mining and lumber companies and large estates. English tractor sales during 1949 were 139, compared to 16 for each of the two previous years.

Ford Promotes Cress in Sales Position

W. L. Cress has been appointed assistant car sales manager of the Ford Div. of Ford Motor Co. He was formerly region sales manager at Kansas City.



Disston Hot Rolled Shape 11 16 lbs per ft

This 3.35 lbs. per ft. is out

- **You don't buy it**
- **You don't machine it**

You can see where the use of Disston Special Hot Rolled Shapes saves production costs and material. These basic savings are stepped up by Disston ability to give you uniform accuracy in all dimensions and remarkably clean finish.

Do you run into difficulty on any hot rolled shapes you use now? Disston skill and facilities will come to your rescue.

What new special shapes will be practical for you? Disston will work them out to save you time and money right from the start.

You can effect distinct economies with special shapes in electric, open hearth and Bessemer grades, hot rolled by Disston.

A few of the many Disston Special Hot Rolled Shapes are shown below, full size.

DISSTON HOT ROLLED SHAPES

BUY DISSTON STEEL SKILL and SERVICE

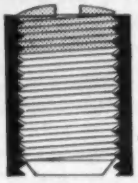
Reg. U.S. Pat. Off

HENRY DISSTON & SONS, INC., 531 Tacony, Philadelphia 35, Pa., U. S. A.

SET SCREWS

Profit by Set Screw Specialization on Puzzling Set Screw Problems

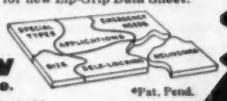
Over 1200 Manufacturers, large and small, depend on Setko for Set Screws. Do you have set screw problems like these: Tough Service; "Tricky" Applications; Small Sizes; Special Materials; Rush Shipments? Then Setko can help you. Write, wire or phone today for catalog, in-stock lists, quotations.



ANOTHER EXAMPLE OF HOW SETKO SOLVES PUZZLING SET SCREW PROBLEMS

ZIP-GRIP* Self-Locking **SET SCREWS and ADJUSTING SCREWS**

Zip-Grip is first with Triple-Locking Action: Interference Fit PLUS Tension PLUS regular Locking Action of Set Screw on Shaft or other part. Also the first to require no supplementary devices or deformed threads. Licks vibration and locks instantly, any given place. For complete description and application data write for new Zip-Grip Data Sheet.



Set Screw & Mfg. Co. SETKO

*Pat. Pend.

16 Main St., Bartlett, Ill.

We Specialize in Solving Puzzling Set Screw Problems

K-F Improves Facilities

(*Continued from page* 39)

fixture, as pictured, consists of a rigid and massive open frame work, carrying a system of hinged arms for clamping at various points. The amount of welding at this stage has been greatly reduced by the slenderness of critical sections while the arc welding of the principal seam from the corner of the rear quarter to the corner of the trunk lid opening has been eliminated and replaced by a small number of spot welds.

Increasing use of monorail conveyors is evident at every turn. Among the conveyor systems recently installed are the two body truck return lines and the enormous stretch of the storage line for sheet metal parts. The engine dress-up line has been about doubled in length to afford smoother flow and better control of detail operations.

The K-F plant has altogether a total of 83,450 ft of conveyors of all types, including about 8500 ft newly installed. An additional 4250 ft of conveyor lines is in the process of installation. K-F also contemplates the installation of a 5100-ft conveyor running from the press shop to a large stamping storage area and when this is completed, the plant will have a total of more than 16 miles of conveyor lines.

Women, especially, pay close attention to the interior trim of your car — and they quickly appraise the excellent quality of Col-O-Vin plastic coated fabrics. Let us show you how perfectly our technicians and design-and-color stylists can work out your requirements with Col-O-Vin.

COL-O-VIN

Call us for information about this splendid product that is supplied in volume to motor car and seat cover manufacturers.

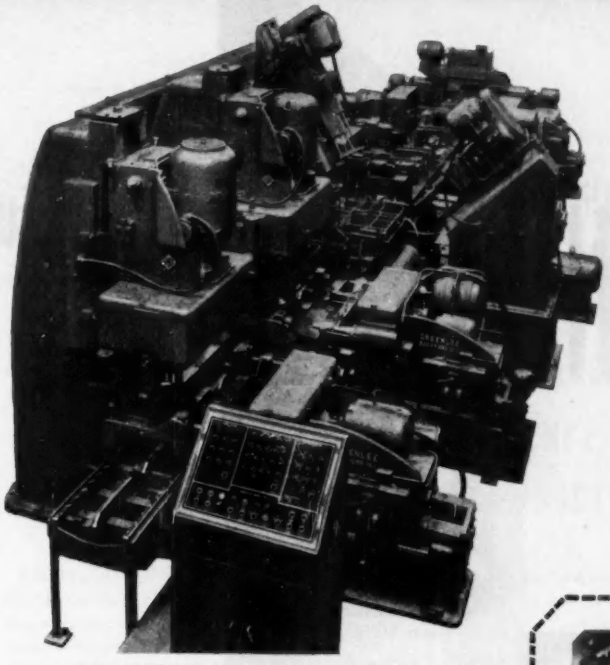
COLUMBUS COATED FABRICS CORPORATION
Main office and factory, Columbus 16, Ohio
New York, Detroit, Chicago, San Francisco, Los Angeles

COL-O-VIN—*plastic coated fabrics*
COL-O-TEX—*pyroxylin coated fabrics*

Quality Coated Fabrics, for

- UPHOLSTERY
- HEADLININGS
- DOOR PANELS
- CARPET BINDINGS
- WELTING
- GENERAL TRIM

GREENLEE



95 OPERATIONS EVERY 72 SECONDS ON *Packard* TRANSMISSION BELL HOUSINGS

AN INTERESTING feature of this machine is its ability to get at the piece from six directions — top, bottom, and all four sides. This is accomplished at two special stations, one which tilts the fixture up on edge for inside work, and one which turns the plate 90° before it goes through the remaining stations. This modern production unit is a 22-station Automatic Transfer Machine which performs a total of 95 drilling, reaming, spot-facing, chamfering, and tapping operations on the end bell of the transmission housing for Packard automobile engines. The cycle time is 72 seconds, giving a capacity for the machine of 40 completed pieces per hour at 80% efficiency. Greenlee machines have pioneered many of the outstanding advantages inherent in Transfer Process equipment — this experience is available toward the successful solution of *your* production problems.

Discharge end of the Packard end bell machine, showing location of the electrical control rack and the hydraulic pump units. The machine is 47 feet long.

FIXTURE

WORK

TWO VIEWS OF WORK ON FIXTURE

PRODUCTION MACHINERY

GREENLEE

GREENLEE BROS. & COMPANY

1755 MASON AVE., ROCKFORD, ILLINOIS

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

ANNOUNCING CELLULITE*

Greater Resiliency

The new Cellulite SPUNFIRM

Greater Tensile Strength

SPUNFIRM WON'T BURN

Permanently fire-resistant, it will not flame or melt under the hot fire of a blowtorch.

SPUNFIRM IS VERMINPROOF

Pure, white, cotton fibres are safe from vermin, termites and organic rot. Will not mildew.

SPUNFIRM IS LIGHT IN WEIGHT

So light in weight that hoisting to skyscraper heights is an easy, one man operation. Quickly installed.

THE GILMAN BROTHERS COMPANY • MAIN OFFICES & FACTORIES

Spun FIRM

TRADE MARK

A NEW COTTON INSULATION THAT RETAINS ITS ORIGINAL FORMED SHAPE AND THICKNESS

A Triumph of RESEARCH
A Triumph of SCIENCE
A Triumph of PRODUCTION

After four years of intensive research, The Gilman Brothers Company, makers of Cellulite Cotton Blanket Insulation, announce a vitally different, immeasurably improved insulation known as SPUNFIRM . . . *the cotton insulation that retains its original formed shape and thickness.*

SPUNFIRM is so resilient, so springy, that it actually *leaps* back into shape when released from a squeezing hand or from under a heavy weight.

SPUNFIRM arrives on the job as it is made, in firm, even thickness and shape, but still light as a feather, *still the lightest weight insulation on the market today.*

SPUNFIRM has an *exceptionally low moisture pick-up from air.* With relative humidity between 86% and 96%, and temperatures at 69° to 72° F., SPUNFIRM *moisture pick-up will not exceed 1.5%.*

SPUNFIRM possesses great tensile strength and elasticity. The long cotton fibres are interwoven and interlocked to prevent "tearing apart" even under stress, and the product's elasticity *snaps* it back into shape.

SPUNFIRM combines both thermal insulating and sound-deadening properties in one material. This *double-duty* feature effects considerable savings in your manufacturing costs, improves your product and offers you an opportunity to increase sales.

SPUNFIRM *can be die cut to your own exacting specifications.*

SPUNFIRM costs no more than ordinary insulation.

SPUNFIRM . . . provides thermal insulation for all types of construction: home, commercial, industrial.

SPUNFIRM . . . provides thermal and acoustical insulation in automobiles, trucks, airplanes, railroad cars.

SPUNFIRM . . . provides thermal and sound insulation in home and commercial freezers, coolers, refrigerators.

SPUNFIRM . . . provides sound deadening insulation in kitchen cabinets and similar household products.

* Patents Pending

The Gilman Brothers Company
Gilman, Connecticut

Please send me sample and data on Cellulite SPUNFIRM Cotton Insulation, without obligation.

Name .....

Title .....

Company .....

Address .....

City ..... *State* .....

GILMAN, CONNECTICUT • ESTABLISHED 1897

Mayari R

selected to resist corrosion in truck bodies for incinerator use

One of the fleet of trucks with bodies designed and built of Mayari R by Truck Equipment Co., Inc., Buffalo, N.Y. Autocar built the trucks. Teco telescopic hoists were used.

Because of its high resistance to atmospheric corrosion, Mayari R low-alloy, high-tensile steel was used for the bodies of a fleet of incinerator dump trucks recently fabricated by the Truck Equipment Company for the City of Buffalo, New York.

These trucks shuttle back and forth between the furnaces and the dumping area, carrying residue from the city incinerators. In the past, the combined rusting effects of the residue and the atmosphere near the incinerators have caused a high rate of failure to dump truck bodies built from plain carbon steel. The new bodies of Mayari R can be expected to give considerably better service.

Mayari R has an excellent record in many similar applications including garbage trucks, coal trucks and trash receptacles where the rate of corrosion is ordinarily severe. It has also outlasted carbon steel many times over in the framework of industrial structures near blast furnaces and coke ovens. Tests conducted in widely separated areas show that steel of this composition has 5 to 6 times the resistance to atmospheric corrosion of plain carbon steel of equal gage.

For details on the applications and properties of Mayari R write for a copy of Catalog No. 259.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Mayari R *makes it lighter... stronger... longer lasting*

PERCENTAGES BY WHICH PUROLATOR MICRONIC ELEMENT EXCELLED COMPETITIVE TYPES

COMPETITOR	IN AVERAGE DIRT CAPACITY PUROLATOR LED BY:
A	199%
B	220%
C	113%
D	547%
E	164%
F	619%
G	255%
H	339%
I	318%
J	193%
K	237%
AVERAGE PUROLATOR SUPERIORITY	290%

Water dilution can't warp, distort, or disintegrate this oil filter!

HERE'S PROOF, TOO, THAT PUROLATOR'S MICRONIC* ELEMENT REMOVES 290% MORE ABRASIVES!

Put a Purolator Micronic* Oil Filter element in a jar of water . . . let it stand for as long as 100 hours . . . it will not warp, distort, or disintegrate!

That's an extremely important Purolator advantage, since the oil in your average crankcase is frequently diluted with as much as 5% water. And as little as 2% water dilution causes many ordinary elements to swell up and practically shut off the oil flow through the filter within a few short hours.

But here's the real pay-off! Purolator removes an average of 290% more abrasives because it filters particles measured in microns (.000039 of an inch) . . . has a filtering surface 5 times that of old-style filters . . . does not permit channeling or unloading.

Car owners everywhere are reading about Purolator via the most aggressive coast-to-coast advertising campaign in the oil filter industry. That's why you'll get greater acceptance for vehicles and engines carrying Purolator Oil Filters as original equipment. For details—and specialized help with your particular filtering problem—contact us direct. *REG. U. S. PAT. OFF.

PUROLATOR PRODUCTS INC.
Rahway, New Jersey
and Toronto, Ontario, Canada

PUROLATOR
MICRONIC OIL FILTER
"FIRST IN THE FIELD OF FILTERING"

Quantity
PRODUCTION
of
GREY IRON CASTINGS

✻

ONE OF THE NATION'S
LARGEST AND MOST MODERN
PRODUCTION FOUNDRIES

✻

ESTABLISHED 1866

THE WHELAND COMPANY

FOUNDRY DIVISION

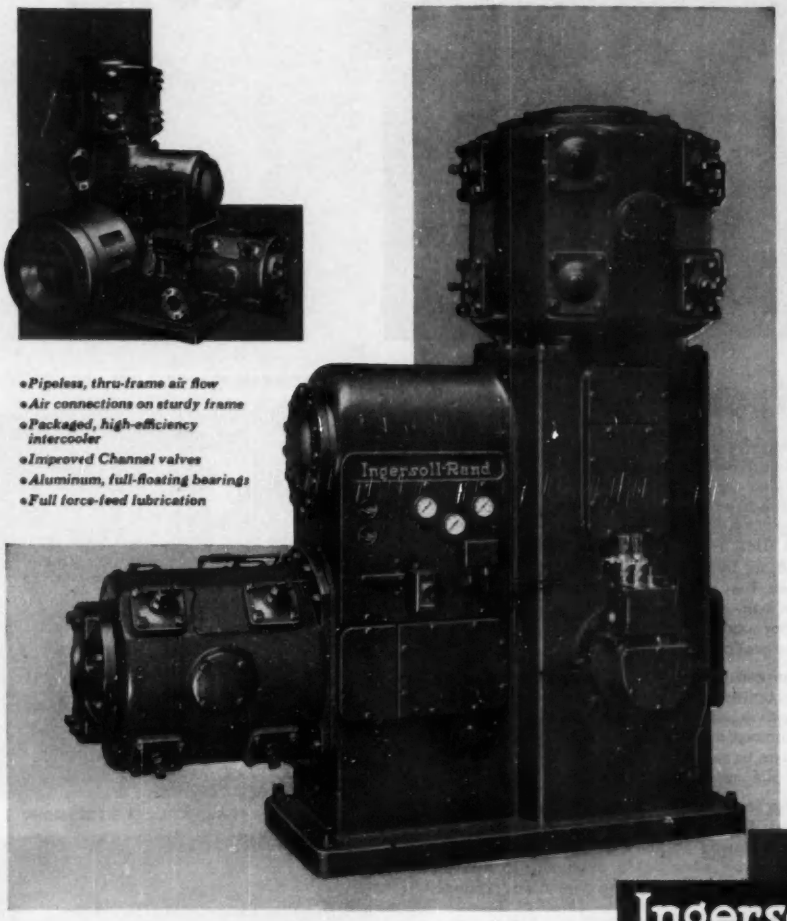
MAIN OFFICE AND MANUFACTURING PLANTS

CHATTANOOGA 2, TENNESSEE

HERE'S A *NEW IDEA* IN ELECTRIC-DRIVEN AIR COMPRESSORS

that means lower costs of Installation, Operation and Maintenance

- *Pipeless, thru-frame air flow*
- *Air connections on sturdy frame*
- *Packaged, high-efficiency intercooler*
- *Improved Channel valves*
- *Aluminum, full-floating bearings*
- *Full force-feed lubrication*



A Packaged
"L" DESIGN

●

THE SIMPLEST
MOST COMPACT
MOST ACCESSIBLE
MOST ECONOMICAL
READY-TO-RUN
HEAVY-DUTY
CROSSHEAD-TYPE

●

TWO-STAGE
80 to 125 psi

●

SIZES
125 to 350 hp

Ingersoll-Rand

XLE

507-1

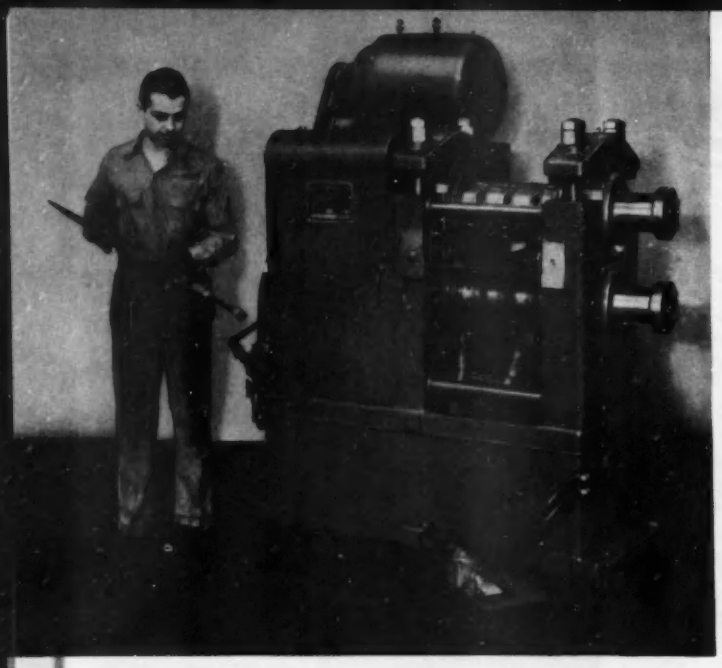
The XLE incorporates a "new look" and a new idea in air-compressor design. It is a heavy-duty, well-balanced, easy-to-keep-clean machine that can be installed with an absolute minimum of effort, time, and cost . . . on a minimum of foundation.

Simplicity of XLE construction, and advanced-design features such as aluminum-alloy full-floating bearings that require no adjustments in a sealed, dust-tight crankcase, result in lower-cost maintenance and a higher degree of dependability.

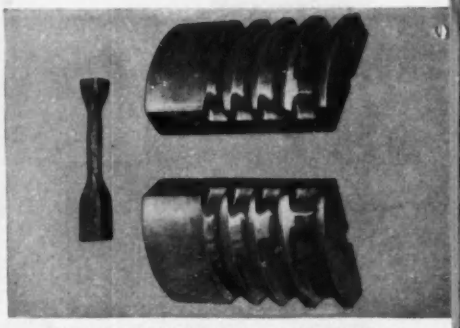
The XLE is a highly efficient compressor built for continuous, full-load operation, and is ideal for factories, railroad shops, mines, powerhouses, and large construction jobs. It is particularly suitable wherever skid-mounting, factory floor, or ground conditions require a well-balanced machine.

FOR MORE INFORMATION on XLE Air Compressors, phone or write the Ingersoll-Rand office nearest you, or write . . .
INGERSOLL-RAND, 11 Broadway, New York 4, N. Y.

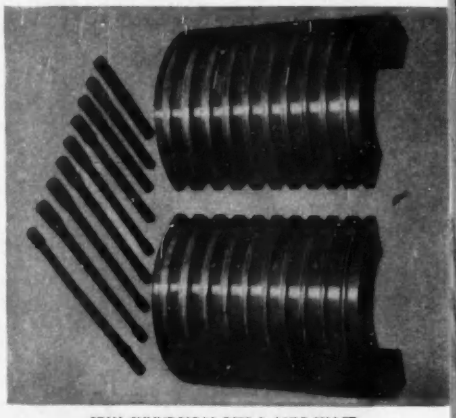
ROCK DRILLS • AIR & ELECTRIC TOOLS • OIL & GAS ENGINES • PUMPS • TURBO BLOWERS



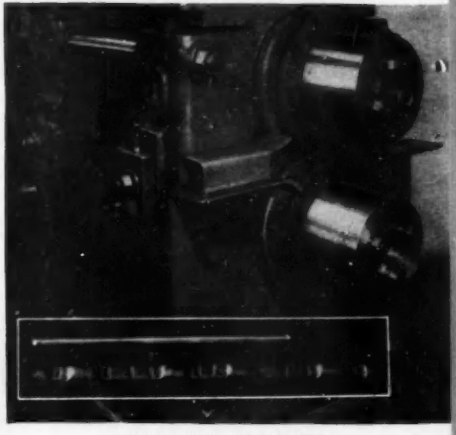
NEW AJAX WIDE ADJUSTMENT FORGING ROLLS



FLAT BACKED SEGMENTAL DIES & CON ROD BLANK



SEMI-CYLINDRICAL DIES & AXLE SHAFT



FULL CYLINDRICAL DIES WITH BLANK BEFORE AND AFTER ROLLING

have the advantages of all 3

Ajax Wide Adjustment Forging Rolls, with the new combination roll shafts, combine all the advantages and economies accruing to the roll method of producing tapered or reduced forgings, and preparing blanks for subsequent forging operations.

FLAT BACKED SEGMENTAL DIES. For short reductions, these economical dies are bolted to the roll shafts between the housings so as to permit quick setting and easy changes. They are economical to make, as most of the machining can be done on both dies simultaneously. They weigh little, can be of high alloy steel. After machining, they can be heat-treated to a high hardness, and the back surfaces can be ground to correct any warpage.

SEMI-CYLINDRICAL DIES. For middle length work, these dies prove most economical. They likewise are bolted to the roll shafts between the housings, and can be conveniently changed. Most of the machining on the two halves can be performed simultaneously when mounted on an arbor. When the work is not too long they can be made reversible, mouthed out at both ends of the impressions where the majority of die wear occurs.

FULL CYLINDRICAL DIES. For long work these dies are mounted on the overhanging right-hand ends of the roll shafts. They can be made most economically as rings, with the cut-away portion only sufficient for feeding the blanks. Their width is limited by permissable overhang, so that the number of grooves must be limited. Overhung mounting permits easy change.

With all three types of dies, there is the great advantage of Ajax Patented Wide Adjustment Gearing, which gives as much as 4 inches adjustment between the roll shafts, permitting as many as ten die redressings. It also makes it easy to maintain the impressions in proper lead match.

The self-contained construction permits moving these machines around the shop to work in conjunction with different Presses or Hammers, wherever their service is required

Continuous operation gives highest production when a considerable series of roll passes is required, but stop-motion with air clutch can be furnished when of advantage in feeding and locating the stock accurately into complex die impressions. Write for Bulletin 91-A.

THE AJAX MANUFACTURING COMPANY

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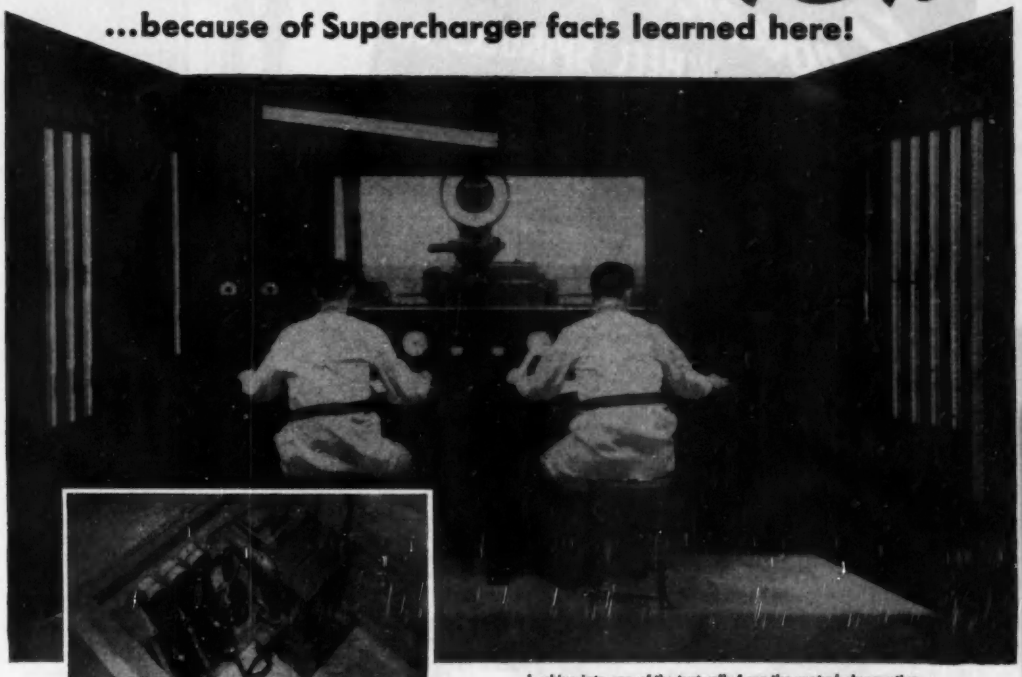
DEWART BUILDING NEW LONDON, CONN

ENGINE POWER INCREASED 45%

...because of Supercharger facts learned here!



Looking into one of the test cells from the central observation room in which all conditions of the test are controlled.

The centrally-located and remotely-controlled oil system for Supercharger and equipment operation.

An observer's view of equipment and supercharger on test.

Here, in the world's finest supercharger test laboratories, Pesco engineers are daily searching for new ways to increase the flexibility and performance of gasoline and Diesel engines *without increasing their weight and size.*

In these supercharger laboratories in the new Pesco plant are all the facilities and equipment that 10 years of research and experience have shown to be necessary and desirable for the continued and expanding development of superchargers, and for investigating supercharged engine performance.

From these tests have come the facts that mean increased performance, better acceleration and more reserve power under all conditions of engine operation . . . facts that mean as much as 45 per cent MORE POWER from the same engine.

For the complete story of what B-W Superchargers can do for your Diesel or gasoline engine, write today.

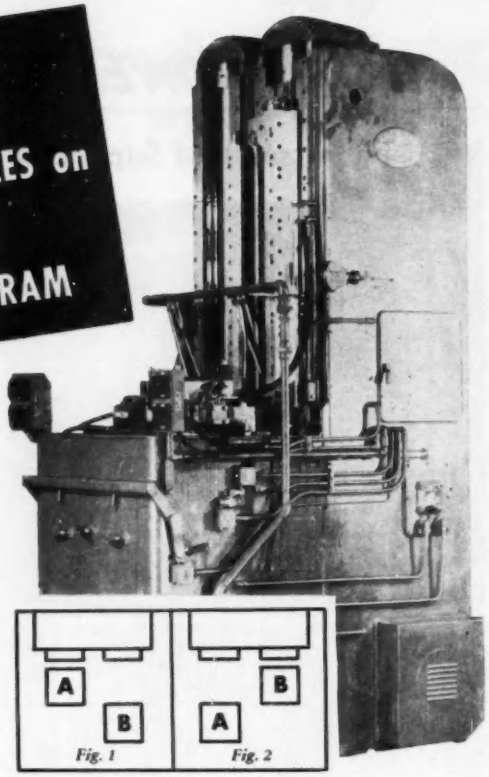
engineering Pesco production

PRODUCTS DIVISION

BORG-WARNER CORPORATION

24700 NORTH MILES ROAD BEDFORD, OHIO

Broaching WHEEL SPINDLES on American DUAL RAM



Straddle broaching the flange faces and the stem end of automotive wheel spindles in one pass was a broaching operation easily adapted to the American Dual Ram Surface Broaching Machine.

The combination of broaching the flange faces and stem end in one pass was possible because of the wide machine slides which are a standard feature on American machines. The part was manually located sideways on the fixture which was provided with a hydraulically interlocked clamp. As the broach assembly was duplicated on each ram and the fixture on each table, one part was broached complete in one pass at each station. This provided a high production rate for these wheel spindles, which are shown before and after broaching in the illustration below.

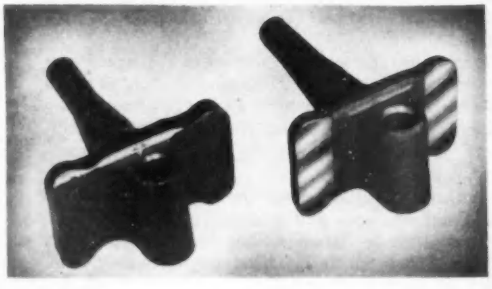


Fig. 1 *Fig. 2*

On the diagram above figures (1) and (2) illustrate the opening cycle of the receding type tables.

In figure (1) table (A) is in broaching position and table (B) is in unload and load position. In figure (2) the tables are reversed and the operator unloads and loads the fixture on table (A) while (B) is in broaching position.

All moving parts of the machine are electrically interlocked as a safety precaution for the operator and the tooling. The machine cycle can be arranged for semi-automatic operation whereby the operator starts each cycle or if the loading time does not exceed the broaching time continuous automatic cycle can be used.

American manufactures a complete line of hydraulic broaching machines for surface and internal operation.

If you have a metal removing operation send a blue print of the part with the required dimensions and hourly production. American engineers will recommend the machine and tooling for the operation without obligation.

Write for free literature Circular 300 covering American's complete line of hydraulic surface broaching machines.

AMERICAN *American* BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

American First—for the Best in Broaching Tools, Broaching Machines, Special Machinery

NOW, EXCLUSIVE NEW

"FREE-FLOATING" SAGINAW TURN INDICATOR SWITCH

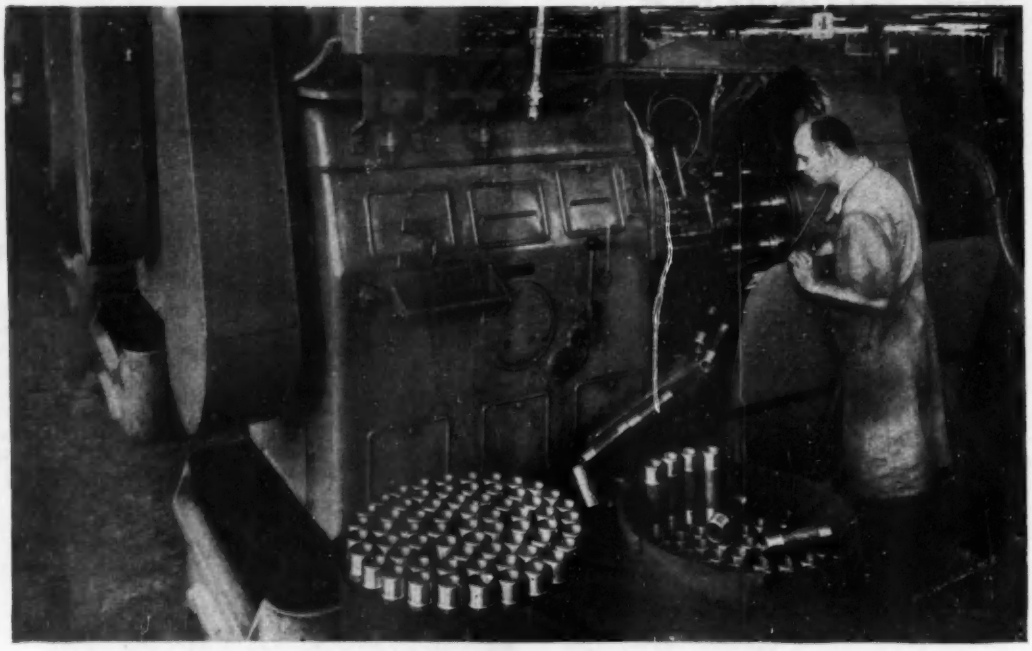
GREATER SAFETY — LONGER LIFE —POSITIVE ACTION

are among the benefits of this exclusive Saginaw "Free-Floating" design. See how it floats freely on hardened rollers in its sturdy housing. For further information and actual demonstration, write or phone the Saginaw Steering Gear Division, Saginaw, Michigan.

Only this exclusive Saginaw "Free-Floating" mechanism gives you all these valuable features:

- **WON'T JAM STEERING GEAR**—Free-Floating mechanism prevents binding of steering mechanism. Tests show that even loose parts dropped into control would not cause steering gear to jam.
- **WON'T OVERTHROW**—Positive stop devices automatically return control lever to neutral and not beyond. Free-floating action prevents lever from returning past center to other direction signal.
- **NO "BLIND" SPOTS**—Control functions properly regardless of the position of the steering wheel. Free-floating design lets turn be signalled even if front wheels are already cramped.
- **OPERATES WITH LIGHT PRESSURE**—Free-floating action revolves about theoretical center out in space. This increased leverage decreases the pressure required to operate control.
- **THIN, CONCENTRIC DESIGN**—Functional styling makes this control an easy fit. Concentricity matches it to handwheel hub and steering column wrapper. Thinness fits it between wheel and gear lever leaving full knee clearance.
- **ALL ROLLER CONSTRUCTION**—Hardened steel rollers add great durability to this control. Critical contact points roll together, eliminating sliding friction, extending trouble-free life.
- **TESTED AND APPROVED**—Tests show this control operative after 200,000 cycles in each direction—four times the SAE requirement for passenger cars. Electrical features approved by the Electrical Testing Laboratories.
- **6-WIRE DESIGN**—This control is designed for 6-wire systems to operate both parking and stop lights on passenger cars—or for 3-wire operation on trucks for separate lamps.
- **STANDARD OR OPTIONAL**—Leading car and truck builders are already adopting this control both as standard and as optional equipment. Simple stamped ring conceals vacant installations.

Saginaw STEERING GEAR DIVISION



MAINTENANCE COST FOR THESE 4 MACHINES:
LESS THAN 2 7/10¢ PER HOUR
FOR 25,913 HOURS' CONTINUOUS PRODUCTION!

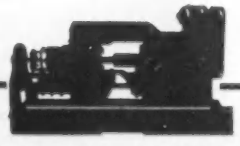
Here's a battery of four machines that has been continuously operating for 25,913 hours, producing a total of 1,215,853 pieces—and at an over-all maintenance cost of only $683.40. That figure covers both labor and materials.

In other words, maintenance averaged only $170.85 per machine! And bear in mind, this remarkable record was made on heavy duty work—the kind that puts a machine to severe test for stamina and sustained accuracy.

Acme-Gridley Automatics are built with basic design advantages for such low-cost performance: The rigid, box-type frame resists vibration, *holds* precision on heavy cuts. Positive, direct, quick-change camming eliminates the need for adjustments to take up wear in loose-connected linkages. It will pay you to investigate Acme-Gridley Automatics when you want the most in metal turning—more good pieces in the pan—with minimum maintenance. May we give you more information?

JOB FACTS

Part: Track Link Bushing.
Size: 2 5/8" Diam. x 8" long; 7½ lbs.
Material: Steel Tubing.
Machine: Acme-Gridley 2 5/8" RB-8 Spindle Automatic Bar Machine.
Performance: Battery of 4 machines operating continuously for 25,913 hours.
Production: 1,215,853 pieces.
Maintenance Charges: $683.40 total (including labor and materials).



ACME-GRIDLEY BAR and CHUCKING AUTOMATICS built in 4, 6 and 8 spindle styles, maintain accuracy at the highest spindle speeds and fastest feeds modern cutting tools can withstand.

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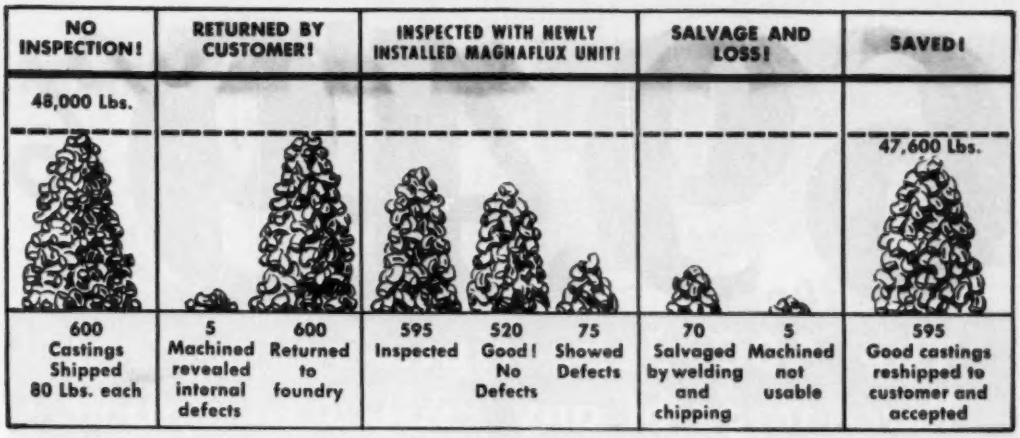
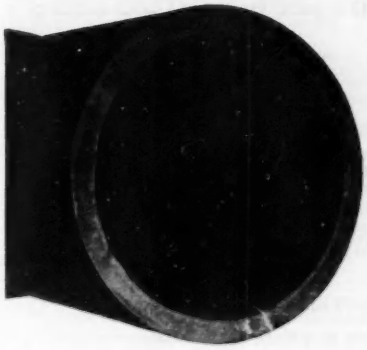


SAVED! 99% of a 24-ton rejected order



Not only are non-visible external defects revealed, but indications of the subsurface shrinkage cracks (inside this casting) are equally as easy to bring into prominence—with Magnaflux inspection.

● A new Magnaflux* Unit, recently installed in a prominent midwest foundry, practically paid for itself on the first job. This foundry completed and delivered 600 large steel castings—24 tons!—to one of their preferred customers. Machining the first five castings uncovered large subsurface shrink cracks, which prompted the customer to return the entire lot as rejects. Shipping costs both ways were a complete waste.

At this point, the newly installed Magnaflux Unit was used to test the 600 castings to find 525 good, 75 with the defects (including the above five). By chipping and welding all the remaining 70 were fully repaired, again Magnafluxed to assure final soundness, and reshipped to be accepted and used by the customer.

The chief inspector of this foundry now, having more experience using Magnaflux, gives it his highest approval as a regular production foundry tool. He uses it for gating and casting control of all new castings which they make.

Perhaps Magnaflux Magnetic Particle Inspection Units are what you need, to overcome manufacturing losses and strengthen control of quality in your plant. Write for full particulars today.

*Magnaflux, Reg. U. S. Pat. Off., a trademark of Magnaflux Corporation applied to its equipment and materials for magnetic particle inspection.

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The fact that 69.49 readers out of every 100—in an industry with the high turn-over of that covered by this magazine (car and truck dealers, independent repair shops, automotive wholesalers)—elect to renew every year, is phenomenal. In fact it is far ahead of any other monthly automotive service magazine.

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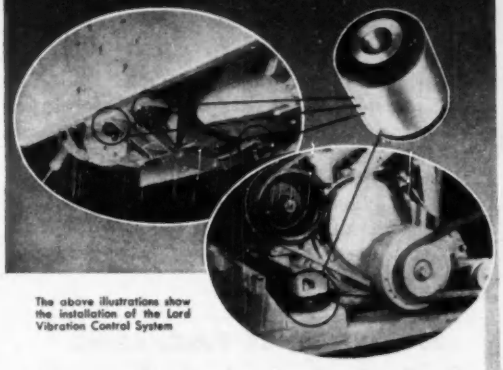
Come to Automotive Headquarters

a LORD VIBRATION CONTROL SYSTEM

Promotes Passenger Comfort Protects Engine and Bus *in the* FLXIBLE CLIPPER 29B1



The above illustrations show the installation of the Lord Vibration Control System

The same Lord Vibration Control System that gives the passengers greater comfort and pleasure also protects the power plant against road shocks, isolates engine vibration from frame and body, reduces repairs and prolongs bus life, builds goodwill for the bus company and the bus manufacturer.

Flxible accomplishes all this by the use of six Lord Vertical Snubbing Tube Form Mountings; two dual units at the transmission and clutch end, and two single units at the fan end of the engine.

This is another illustration of the extreme importance of vibration control, and of the low first cost and long-time economy of a Lord Engineered Vibration Control System. Whether your product is as large as a bus or as small as a dial gauge, its life can be lengthened and the quality of its service improved by a Lord Vibration Control System.

See our Bulletin in Sweet's 1949 File for Product Designers or write for Bulletin 900 today. It describes the complete line of Lord products and services.

LORD MANUFACTURING COMPANY, ERIE, PA.

Canadian Representative: RAILWAY & POWER ENGINEERING CORP. LTD.

LORD Vibration Control Systems

RUST

The biggest THIEF in America!

ALL through the summer—through hot, humid days and hot, humid nights—the biggest thief in America will be raiding your plant, stealing your profits, stealing your steel.

In every department—where raw steel comes in, where it is stamped or milled or machined or ground, where it is pickled or cleaned or assembled—the moisture in the air is always helping that big thief, RUST, to rob you of production.

But you don't have to put up with this moist-month thievery. The Oakite Technical Service Representative can help you defeat RUST. He is well equipped with methods and materials for:

1. **Removing rust from raw stock**
2. **Preventing rust while parts are being processed**
3. **Cleaning and de-rusting in one operation**
4. **Cleaning with simultaneous conditioning for painting plus protection against rust before and after the steel is painted.**

FREE Phone the Oakite Technical Service Representative in your city or write to Oakite Products, Inc., 28A Thames St., New York 6, N. Y., for full information about arresting RUST in every part of your plant.

ALSO *ask about Oakite procedures for:*

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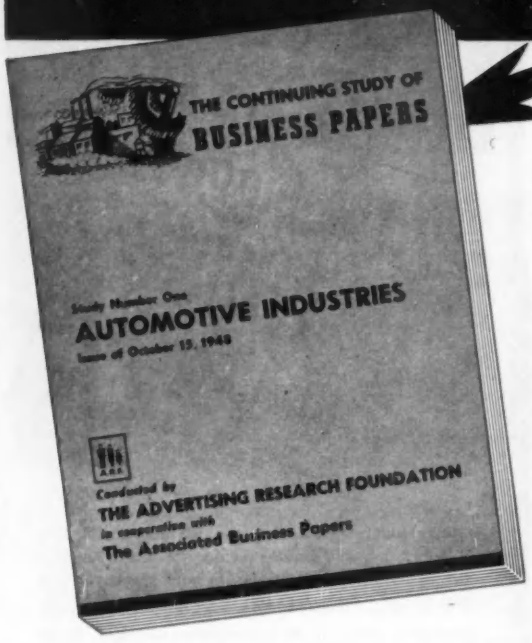

Now you have it . . . the first factual, authentic study of readership of an industrial magazine . . . the Advertising Research Foundation's Study #1 of the Continuing Study of Business Papers project.

Never before has such an intensive survey been made on any industrial publication. Using the October 15th, 1948 issue of AUTOMOTIVE INDUSTRIES as the subject, the A.R.F. conducted the study to obtain the degree of readership, what its potential audience is, detailed information on subscribers and readers, "pass-along" circulation, purchasing influence of readers and other useful data.

This $20,000 study was made under the combined sponsorship and cooperation of the A.N.A., A.A.A.A., A.B.P. and N.I.A.A. The results obtained provide factual evidence of the tremendous readership and advertising impact AUTOMOTIVE INDUSTRIES offers to advertisers who want to reach effectively the buying influence in the automotive manufacturing field . . . America's #1 industrial market.

The following facts revealed by the A.R.F. Study of the readership of AUTOMOTIVE INDUSTRIES *represent only a portion of the data included in this study.*

89% QUALIFIED AS READERS

Of the claimed readers interviewed by the study, 89% passed the rigid reader qualification test. Study included "pass-along" readers and subscribers.

75% INFLUENCE PURCHASING

61% directly enter into purchases, while 14% recommend in the purchase of parts, materials, supplies, plant and production equipment.

96% READ ONE OR MORE ADS

Only 4% of the qualified readers did not read any of the ads in the October 15th issue. ALL readers had read one or more of the editorial articles.

81% SPECIFY BRANDS OF PRODUCTS

81% of the readers influential in purchasing specify makes or brands of the products they buy in over 3000 automotive manufacturing plants.

AUTOMOTIVE INDUSTRIES

A CHILTON Publication

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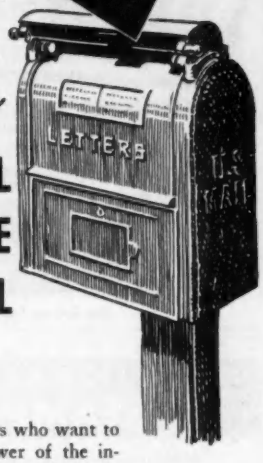

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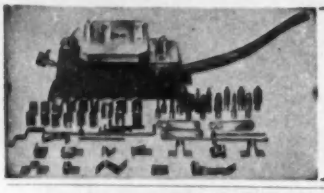

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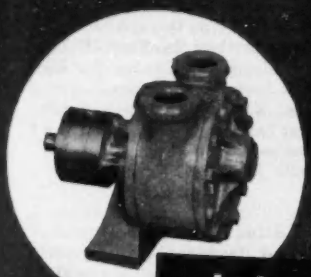

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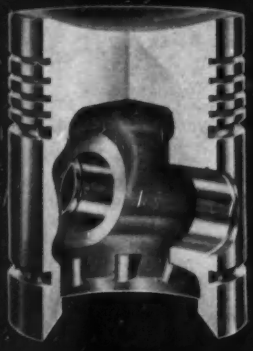

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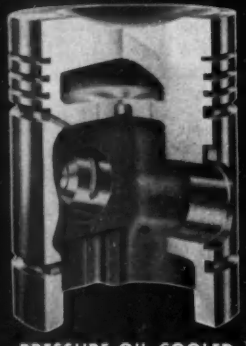

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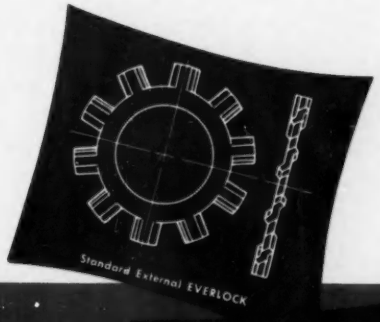

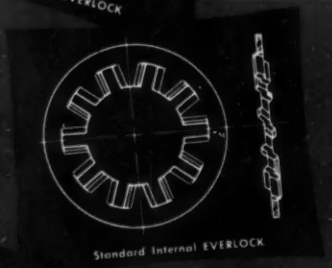

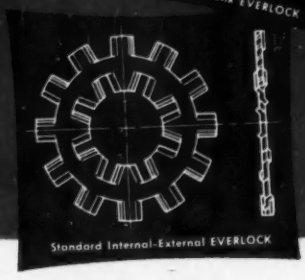

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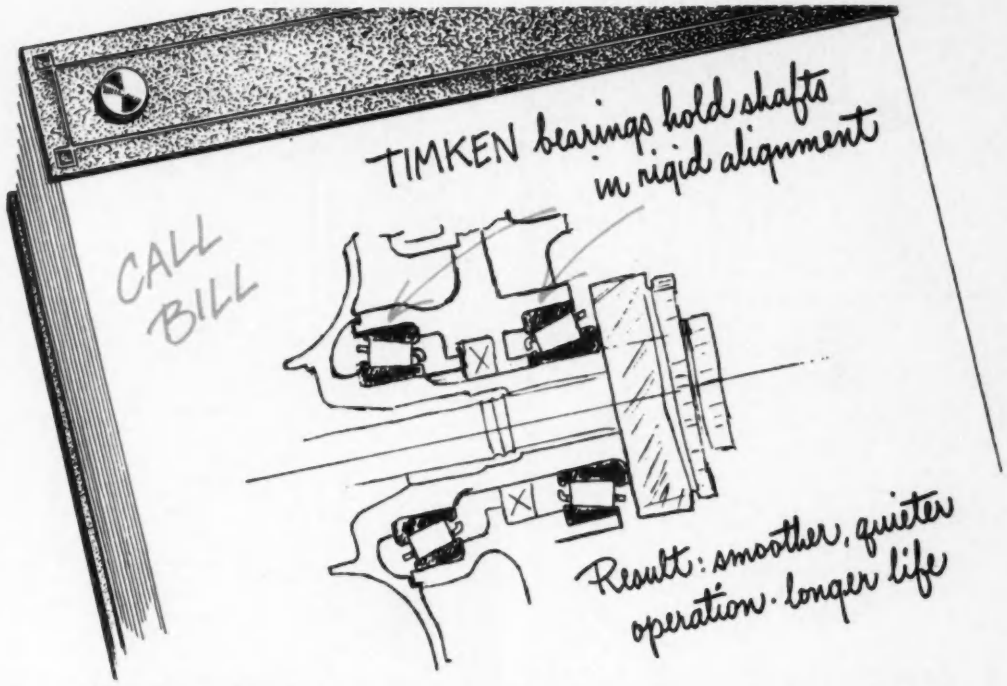

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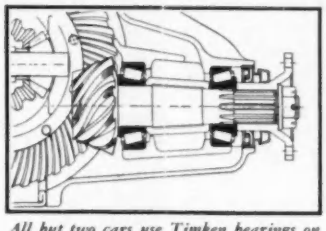

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